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Des Moines 208 Areawide Waste Treatment Management Plan

Environmental Protection Agency, Kansas City, Mo Region VII

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**FINAL
ENVIRONMENTAL IMPACT STATEMENT
for
DES MOINES
208 AREAWIDE WASTE TREATMENT
MANAGEMENT PLAN**



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VII — KANSAS CITY, MISSOURI**

JULY 1977

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16. ABSTRACT The Central Iowa Regional Association of Local Governments (CIRALG) has prepared the Areawide Waste Treatment Management Plan for Des Moines, Iowa. The 208 study area contains approximately 800 square miles, including most of Polk County and parts of Dallas, Warren, and Jasper Counties. The plan was developed according to Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The U.S. Environmental Protection Agency (EPA) provided funding for the plan. EPA has determined that its approval of the plan is a major Federal action with the potential of affecting the quality of the human environment and, therefore, has prepared an environmental impact statement (EIS) pursuant to Section 102 (2)(c) of the National Environmental Policy Act of 1969 (P.L. 91-190). The plan includes structural and nonstructural programs for controlling point, intermittent point, and nonpoint sources of pollution. Management alternatives are also provided in the study. The EIS discusses the primary and secondary impacts to accrue from these programs, including the effects upon water, quality and quantity, air quality, land use, socio-economics, archaeological and historic sites, fauna and flora, environmentally sensitive areas, and energy usage.		
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
1735 BALTIMORE
KANSAS CITY, MISSOURI 64109

JUL 27 1977

TO: ALL INTERESTED GOVERNMENT AGENCIES, ORGANIZATIONS, AND CITIZENS

This notice transmits the Final Environmental Impact Statement (EIS) for the Des Moines Areawide Waste Treatment Management Plan. The document has been prepared pursuant to Section 102(2)(c) of the National Environmental Policy Act of 1969 (P.L. 91-190).

According to Section 208(a)(2) of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500), the Central Iowa Regional Association of Local Governments (CIRALG) has prepared the plan with funding provided by the U.S. Environmental Protection Agency (EPA). The plan is intended to be a management document which identifies waste treatment problems and their effects upon water quality in the Des Moines area. Technical and management programs have been developed which are intended to alleviate these problems and are ultimately aimed at achieving and maintaining a quality of water which can provide for all necessary uses within the Des Moines metropolitan area. The EIS is EPA's analysis of environmental impacts of the plan prepared by CIRALG.

The Draft EIS was prepared by EPA and distributed to interested individuals and organizations on April 6, 1977. The Council on Environmental Quality published notice of the Draft EIS in the Federal Register on April 22, 1977.

No administrative action will be taken on this plan prior to 30 days from receipt of this document and until EPA has given consideration to all comments received regarding the final statement.

We appreciate your interest in this matter.

Sincerely yours,

Charles V. Wright
Charles V. Wright
Acting Regional Administrator

Enclosures

EPA-7-Des Moines-Dallas,
Polk, Warren-AWTMP-77-005
FEIS-005
July, 1977

FINAL
ENVIRONMENTAL IMPACT STATEMENT
for the
DES MOINES 208 AREAWIDE WASTE
TREATMENT MANAGEMENT PLAN
DES MOINES METROPOLITAN AREA,
DALLAS, POLK, AND WARREN COUNTIES, IOWA

prepared by

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION VII
KANSAS CITY, MISSOURI

information furnished by

CENTRAL IOWA REGIONAL ASSOCIATION OF LOCAL GOVERNMENTS

with the assistance of

KIRKHAM, MICHAEL CONSORTIUM

Approved by:

Charles V. Wright
Charles V. Wright
Acting Regional Administrator

Summary

AREAWIDE WASTE TREATMENT MANAGEMENT
PLAN, DES MOINES, IOWA

() Draft (X) Final

Responsible Office: U.S. Environmental Protection Agency, Region VII,
1735 Baltimore, Kansas City, Missouri 64108, telephone 816-374-2921.

1. Type of Action: (X) Administrative () Legislative

2. Description of Action: The Central Iowa Regional Association of Local Governments (CIRALG) has prepared the Des Moines Metropolitan Areawide Waste Treatment Management Plan. Several municipalities and three counties are represented by CIRALG. The Des Moines Metropolitan Sewer Planning Policy Committee was for the most part responsible for the review and advisory functions required in producing the plan.

The plan has been developed pursuant to Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500). The U.S. Environmental Protection Agency (EPA) has determined that its approval of the Des Moines plan is a major Federal action with the potential of affecting the quality of the human environment. As required under Section 102(2)(c) of the National Environmental Policy Act of 1969 (Public Law 91-190), EPA must prepare an environmental impact statement regarding its approval of the plan.

The proposed plan includes structural and nonstructural programs for the control of point, intermittent point and nonpoint pollution sources. Proposed point source actions for the central urban area include the construction of a wastewater collection system with 13 flow-equalization basins for the control of maximum infiltration/inflow quantities and the construction of a new sewage treatment facility immediately east of the existing Des Moines wastewater treatment plant. To meet the required degree of secondary treatment, the new plant is proposed to have an activated biofilter unit followed by supplemental aeration. The flow following the first stage biological unit is proposed to receive split treatment, wherein a portion of the flow will receive tertiary treatment to meet ammonia standards. Dewatered anaerobic sludge will be applied to agricultural land or disposed at the Metropolitan landfill operation.

The plan proposes that collection systems and controlled discharge lagoons be constructed for some outlying communities. The plan also recommends that some other communities upgrade their existing lagoon systems to provide for adequately controlled discharges. For another community, the plan recommends either building a new mechanical plant or a modified controlled discharge lagoon. It also suggests that one other community upgrade its existing mechanical lagoon system and another construct a collection system and mechanical treatment facility.

Proposed intermittent point source controls for the Integrated Community Area include segregation of combined sewers and the installation of flow separators at selected combined and storm sewer discharge points. Segregation of combined sewers actually occurs as part of the proposed interceptor system. It has been recommended that a new lift station, force main and outfall sewer be constructed to collect the wastewater from northwest Des Moines, Johnston, Urbandale, Beaver Creek, Camp Dodge, Lovington, West Ankeny, and Saylor Township (an unincorporated area). The wastewater from these areas will then be segregated from the Westside Interceptor and transported beyond the combined sewer overflow area. In addition to segregation, flow separators to be located at selected combined sewer overflows and storm sewer discharge points are also recommended as intermittent point source controls.

The plan recommends nonpoint sources of pollution be controlled by nonstructural programs. These actions include reducing nonpoint source pollution from cropland, construction sites, and unincorporated areas. For additional control of cropland runoff, the plan recommends a subsidy program be implemented to increase the cost-sharing for the construction of terraces and grade stabilization structures. Passage and enforcement of ordinances aimed at controlling pollution from construction sites are also recommended. Local planning entities are expected to help effect reductions in urban development.

3. Environmental Impacts: The proposed plan will significantly improve the water quality in the area and eliminate water quality standard violations in the area's receiving streams under both critical wet and dry weather conditions.

Point source controls are expected to have a major impact on surface water quality, but have very little effect on water quantity. The proposed plan requires the abandonment of many inefficient treatment plants which should improve the water quality of the receiving streams in the area (especially Des Moines River, Beaver Creek, Walnut Creek, and Raccoon River). Dissolved oxygen levels should increase, while fecal coliform and ammonia-nitrogen levels are expected to decrease.

Intermittent point source controls will require separated sewage to be removed from the combined sewer system. This should greatly improve the quality of the Des Moines River by reducing its pollution loading.

The nonpoint source control programs are expected to result in significantly decreased water pollution in all receiving streams. Coordinated land use control programs should have an overall beneficial impact on the environment. Open space programs and development controls would help protect environmentally sensitive areas; including flood plains known to be sources of potable water, surface waters, wetlands, 100-year flood plains and flood retention areas, ground water recharge areas, prime agricultural lands, and public outdoor recreation areas.

The proposed plan should have no primary impact on air quality in the area. It does not propose that sludge be incinerated. Air emissions from the treatment facilities should be minimal.

The three source control programs should eliminate all water quality standard violations in the area's major streams and create a significant beneficial impact on the environment. Impacts on archeological and historic sites, energy usage, and economics are not expected to be significant.

4. Adverse Environmental Effects: During the construction of the proposed collection and treatment facilities and equalization basins, locally disruptive fugitive dust will be emitted. The severity of dust emissions will be dependent upon weather conditions. Other temporary impacts resulting from construction activities will be the disruption and relocation of wildlife, augmented construction noise levels, disturbance of existing vegetation, and disruption of existing land uses; e.g., traffic and other urban activities.

An adverse impact associated with the operation of treatment facilities is the generation of sludge. The methods used to dispose of and/or apply the sludge will determine the degree and kinds of impacts which may result.

5. Alternatives: General alternatives of the plan include: Modification of the existing management plan, resulting in different methods of implementing the programs herein described; alternate methods of wastewater treatment; alternate sludge disposal and treatment methodology; alternate subplans for minimizing point, intermittent point and nonpoint pollution discharges.

The alternate areawide plans presented in this statement are listed below:

a. Expanding the existing Des Moines treatment plant, segregation of combined sewers, promotion of cropland runoff control options and possible increases in street sweeping.

b. Same as (a), with the passage and enforcement of ordinances for controlling erosion and sedimentation from construction sites and reduction in the urban development or agricultural land.

c. Expanding the existing Des Moines plant, segregation of combined sewers, flow separators for combined sewer overflows and strategic storm sewer discharges, promotion of cropland runoff control options and possible increases in street sweeping.

d. Same as (c), with the passage and enforcement of ordinances for the control of erosion and sediment from construction sites and reductions in the urban development of agricultural land.

e. Constructing a new areawide wastewater treatment plant, segregating combined sewers, promotion of cropland runoff control options, and possible increases in street sweeping.

f. Same as (e), with the passage and enforcement of ordinances for controlling erosion and sedimentation from construction sites and reducing urban development of agricultural land.

g. Constructing a new areawide wastewater treatment plant, segregation of combined sewers, flow separators for combined sewer overflows and strategic storm sewer discharges, promoting cropland runoff control options and possible increases in street sweeping.

h. Same as (g), with the passage and enforcement of ordinances for controlling erosion and sedimentation from construction sites and reductions in urban development of agricultural land.

6. Date Available to the Council on Environmental Quality and to the Public:

Draft statement - April 22, 1977

Final statement - July, 1977

Distribution list is attached

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ABBREVIATIONS

BOD, BOD ₅	Five day biochemical oxygen demand. Typical measurement for the strength of wastewater.
BOD _u	Ultimate biochemical oxygen demand.
BOD _n	Ammonia nitrogen (nitrogenous) biochemical oxygen demand.
COD	Chemical oxygen demand.
S.S.	Suspended solids.
D.O.	Dissolved oxygen.
T.N.	Total nitrogen.
T.K.N.	Total kjeldahl nitrogen.
NH ₃ (N)	Ammonia as nitrogen.
N	Nitrogen.
PO ₄ (P)	Phosphate as phosphorous.
P ₂ O ₅	Oxide of phosphorous.
K ₂ O	Oxide of potassium.
pH	Measure of the intensity of the acid or alkaline condition of a solution. pH of 7 is neutral, below 7 is acid and above 7 is alkaline.
LC ₅₀	This term is used for expressing the results of bioassay tests, which are used to evaluate the toxicity of wastewaters to the biological life of the receiving streams. The LC ₅₀ for a given waste is the concentration that will kill 50 percent of the test organisms in a specified time period.
Cr	Chromium.
Zn	Zinc.
Cu	Copper.
Mg	Magnesium.

gpm	Gallons per minute.
gpd, GPD	Gallons per day.
mgd, MGD	Million gallons per day.
cfs	Cubic feet per second.
gpad	Gallons per acre per day.
gpcd	Gallons per capita per day.
mg/l	Milligrams per liter.
ug/l	Micrograms per liter.
lb/day	Pounds per day.
g, gm	Grams.
Kg	Kilogram.
MPN/100 ml	This term is used for expressing the statistical estimate of the coliform bacteria concentration as a most probable number of coliforms per 100 milliliters.
d.u.	Dwelling unit.
I/I	Infiltration/Inflow.
N.A.	Not available or not applicable.
Avg.	Average.
NPDES	National Pollutant Discharge Elimination System.
DEQ, IDEQ	Department of Environmental Quality (Iowa).
EPA	Environmental Protection Agency (Federal).
SWMM	Storm Water Management Model.
ICA	Integrated Community Area.
WWTP	Wastewater Treatment Plant.

CHAPTER I - BACKGROUND

Introduction

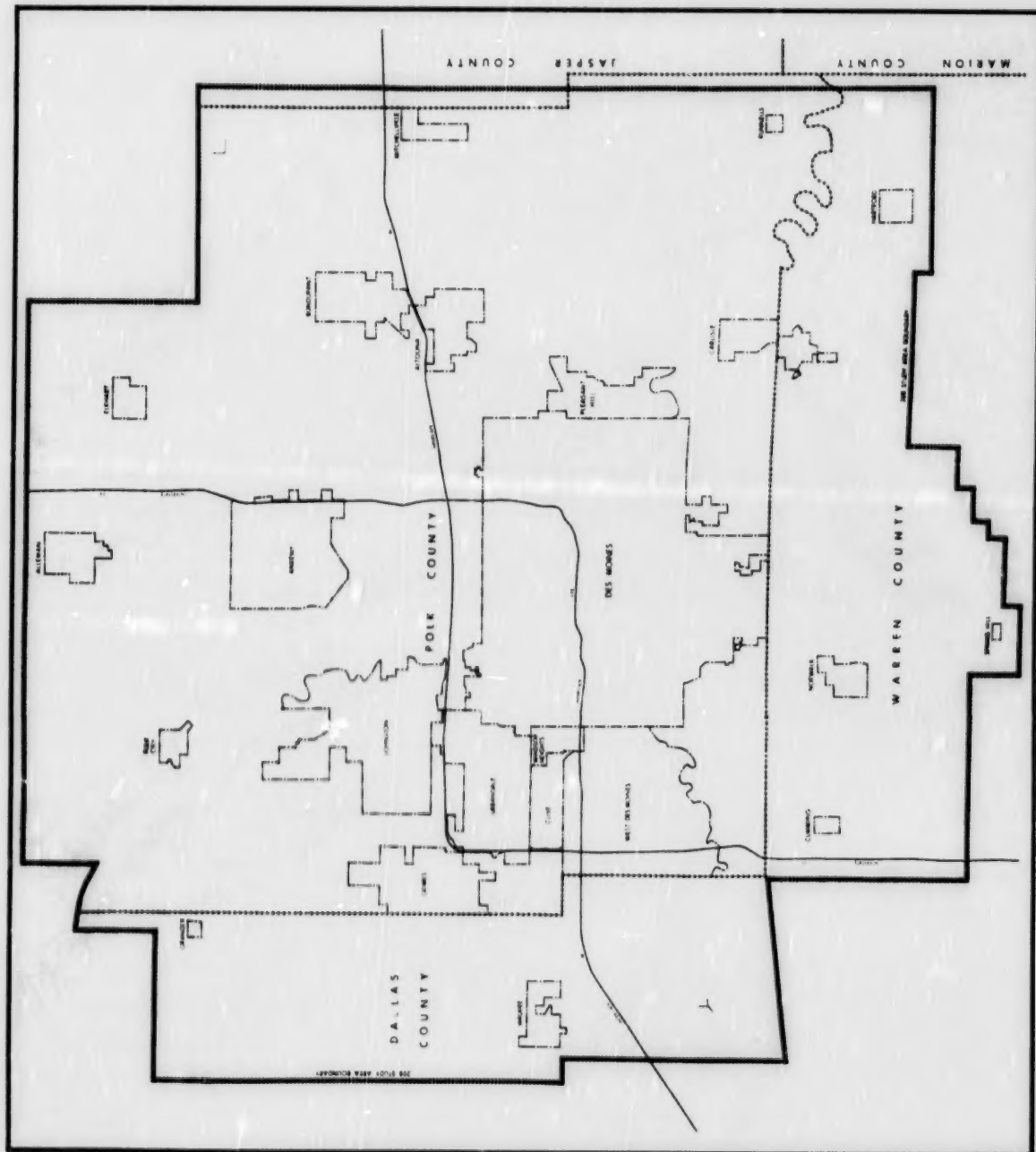
The Des Moines Metropolitan Areawide Waste Treatment Management Plan was prepared by the Central Iowa Regional Association of Local Governments (CIRALG) with the assistance of the Kirkham, Michael and Associates Consortium. Cities and Counties represented by CIRALG were Alleman, Altoona, Ankeny, Bondurant, Carlisle, Clive, Cumming, Dallas County, Des Moines, Elkhart, Granger, Grimes, Hartford, Johnston, Mitchellville, Norwalk, Pleasant Hill, Polk City, Polk County, Runnells, Spring Hill, Urbandale, Warren County, Waukee, West Des Moines and Windsor Heights. (See Plate I-1.)

Throughout the planning process the Des Moines Metropolitan Sewer Planning Policy Committee (itself served by six committees and subcommittees) served the major review and advisory role. The Committee consisted of voting members from 23 of the units of government listed above and non-voting members of the remaining three. The Policy Committee gave its final endorsement to the proposed plan by the unanimous vote of those present on January 27, 1977. The six committees and subcommittees had local citizen representatives as well as resident local, state and federal professional and governmental representatives.

This report is based on the more detailed information about the plan and plan development provided in the Interim Reports (Phase 1 - January 19, 1976; Phase 2 - November, 1976; Phase 3 - February, 1977) and in the Final Report - April, 1977.

DES MOINES 208 AREAWIDE WASTE TREATMENT MANAGEMENT STUDY AREA

I-2



SCALE IN MILES
0 1 2



CIRCO
CENTRAL IOWA REGIONAL ASSOCIATION
OF LOCAL GOVERNMENTS

KM
KIRKHAM MICHAEL

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PREPARATION OF THIS MAP WAS FINANCED THROUGH A GRANT FROM THE
U.S. ENVIRONMENTAL PROTECTION AGENCY UNDER SECTION 208 OF THE
FEDERAL WATER POLLUTION CONTROL ACT (AMENDMENTS OF 1972)

Brief Description of Structural
and Non-structural Actions Proposed

The proposed areawide plan includes structural and non-structural actions for the control of point, intermittent point and non-point sources of pollution. (See Plate I-2.) The proposed structural actions may be classified as Best Practicable Waste Treatment Technology (BPWTT) and the proposed non-structural actions may be classified as Best Management Practices (BMP).

Proposed point source actions for the central urban area include the construction of a wastewater collection system with 13 flow-equalization basins for the control of maximum infiltration/inflow quantities and the construction of a new treatment facility immediately east of the existing Des Moines wastewater treatment plant. It is proposed that the required degree of secondary treatment at the new plant be achieved by utilizing an activated bio-filter (ABF) unit followed by a second stage activated sludge system for nitrification. Split flow treatment would be utilized by using the first stage biological unit (ABF tower) by itself or in combination with the activated sludge units. Anaerobic sludge disposal followed by solids dewatering with disposal on agricultural land or at the Metro landfill is proposed.

One PL 92-500, Section 201 (facilities planning) project is underway for the City of Runnells. The City of Norwalk is prepared to proceed with facilities planning, pending the completion and final outcome of the 208 areawide plan. Altoona, Ankeny, Bondurant, Granger, Grimes, Mitchellville, Waukee and the Southside sub-system of Des Moines have received notice to proceed from EPA on Section 201 sewer system evaluation surveys (SSES). Approximately six communities and sub-systems have so far been found non-excessive in infiltration, and approximately 12 other communities and sub-systems have received EPA and DEQ concurrence in the infiltration/inflow analyses and are at various stages of progress in initiating SSES studies.

H-4

RECOMMENDED TECHNICAL PLAN

- PROPOSED GRAVITY SEWER
- - - PROPOSED FORCE MAIN
- EXISTING SEWER
- PROPOSED LIFT STATION
- EXISTING WASTEWATER TREATMENT FACILITY
- PROPOSED WASTEWATER TREATMENT FACILITY
- EXPANSION TO EXISTING FACILITY
- REGIONAL WASTEWATER TREATMENT FACILITY
- ▲ PROPOSED EQUALIZATION BASIN
- * COMBINED SEWER FLOW SEPARATORS
- STORM SEWER FLOW SEPARATORS

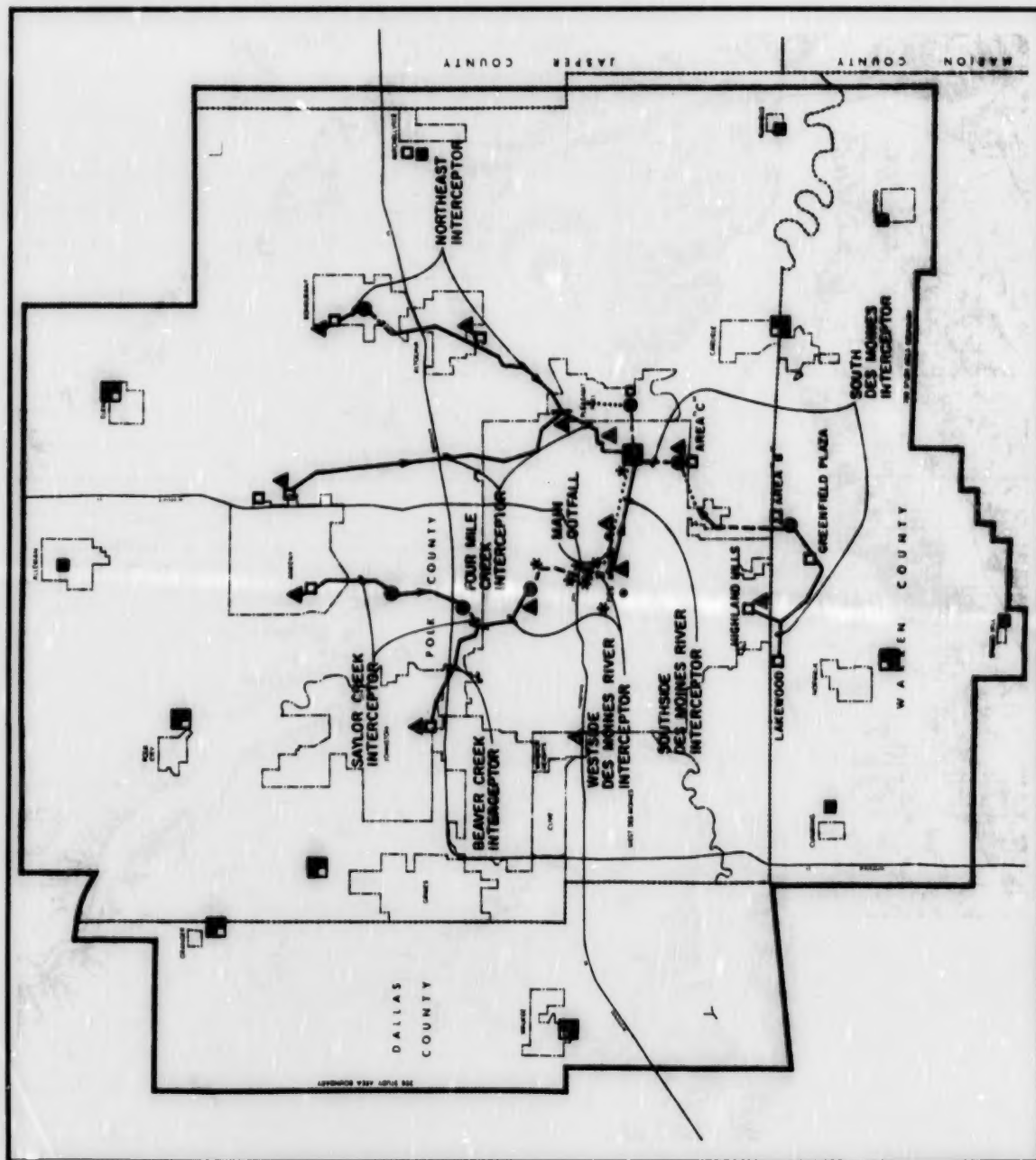
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Central Iowa Regional Association of Local Governments

KIRKHAM MICHAEL AND ASSOCIATES
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AMERICAN CONSULTING SERVICES, INC.
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PREPARATION OF THIS MAP WAS FINANCED THROUGH A GRANT FROM THE U.S. ENVIRONMENTAL PROTECTION AGENCY UNDER SECTION 208 OF THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972



National Pollutant Discharge Elimination System permits are required for the proposed areawide wastewater treatment plant, for all facilities in outlying communities which discharge treated effluent (see paragraphs below) and for all industries discharging directly to receiving streams.

Thirteen communities have been classified as "outlying communities" due to the cost-effectiveness associated with including them in the Integrated Community Area (ICA). For the following communities it is recommended that collection systems and controlled discharge lagoons be constructed:

1. Alleman
2. Cumming
3. Hartford
4. Spring Hill

The following communities should upgrade existing lagoon systems to provide for controlled discharge:

1. Carlisle
2. Elkhart
3. Granger
4. Norwalk
5. Polk City

Mitchellville should either build a new mechanical plant or a modified controlled discharge lagoon. Grimes should upgrade its existing mechanical-lagoon treatment system and Runnells should construct a collection system and mechanical treatment plant. Waukee should upgrade its existing aerated lagoon system and add rock filters for effluent polishing.

Proposed intermittent point-source controls for the ICA include segregation of combined sewers and the installation of flow separators at selected combined and storm sewer discharge points. Segregation of

combined sewers actually occurs as part of the proposed interceptor system in which a new lift station, force main and outfall sewer should be constructed to collect the wastewater from the northwest Des Moines area, Johnston, Urbandale, Beaver Creek, Camp Dodge, Lovington, West Ankeny and parts of Saylor Township. The wastewater from these areas would then be segregated from the Westside Interceptor and transported around the combined sewer overflow area. In addition to segregation, flow separators located at selected combined sewer overflows and storm sewer discharge points are also recommended as intermittent-point source controls.

Non-structural actions contained within the plan are primarily for non-point source pollution control. The non-structural items proposed include programs for reducing non-point source pollution from cropland, construction sites and unincorporated areas. For additional reduction of cropland source pollution, an increase in the subsidized cost-sharing program for the construction of terraces and grade stabilization structures has been recommended. The passage and enforcement of ordinances for the control of pollution from construction sites has also been recommended. Reductions in the urban development of unincorporated areas would be achieved through local governmental land use control programs.

Brief Summary of Water Quality and Water Quantity Problems in the Study Area

Iowa water quality standards are violated periodically in rivers and streams in the study area. These occur primarily in winter or during low-flow conditions and consist of violations of coliform bacteria levels, dissolved oxygen and ammonia downstream of municipalities which discharge wastewater. Ammonia violations are the most frequent.

Pesticides, such as dieldrin, DDT and its breakdown products, have been detected in higher than recommended concentrations in study area streams.

Turbidity during periods of heavy storm runoff is high in area rivers and streams.

Water temperature in the Des Moines River downstream of the City of Des Moines is a potential problem, but adequate data on source and extent are lacking at the present time.

Concentrations of phosphorus and nitrogen compounds are high enough in area rivers and streams to cause significant eutrophication, although other factors often limit eutrophication - such as temperature and turbidity.

Periodic flooding occurs on area rivers and streams, particularly Beaver Creek, Walnut Creek, Raccoon River, Middle River, Lower Des Moines River and Four Mile Creek.

Total Anticipated Cost

The estimated total area wide plan construction cost is approximately \$142 million. Approximately \$108 million will be required for the Integrated Community Area (ICA) point-source control construction cost and approximately \$1.3 million for the ICA intermittent point-source control construction cost. The construction of new wastewater treatment facilities and improvement of existing facilities for outlying communities will require \$5 million. Federal and State grants for point-source control are estimated to be \$85 million and \$6 million, respectively. Presently, intermittent point-source controls are not eligible for EPA grants.* The estimated local share of the total construction cost for intermittent and point-source control is \$24 million of which approximately \$1 million is for the outlying communities and the remainder for the ICA. An additional \$8 million will be required for collection systems.

* Other federal programs are (or may be) able to provide assistance for these proposals.

Approximately \$27.5 million would be required for non-point source control construction costs. Erosion and sediment control at construction sites has been estimated to cost \$2.5 million. Construction costs for terraces and grade stabilization structures have been estimated to cost a total of approximately \$50 million; assuming continued state cost-sharing at 50 percent, the local cost would be \$25 million. Presently, non-point source controls are not eligible for EPA grants.*

*Other federal programs are (or may be) able to provide assistance for these proposals.

CHAPTER II - THE ENVIRONMENT WITHOUT THE PROPOSED ACTION

Introduction

The Des Moines 208 study area contains approximately 800 square miles and includes most of Polk County, parts of Dallas and Warren Counties and a very small part of Jasper County. The total 1975 population was approximately 315,000. The City of Des Moines (population about 200,000) is surrounded by an inner tier of 12 municipalities and an outer tier of 10 freestanding rural communities. In addition there are several unincorporated areas that are primarily residential and have only minimal community facilities. These communities lie close to the urban area.

The study area falls almost entirely within the Des Moines River Basin; a small area in the northeast corner drains to the Skunk River. Twelve tributary streams in the study area flow to the Des Moines River, the largest being the Raccoon River. A large fraction of the potable water supply for the study area is taken indirectly from the lower Raccoon River via intake galleries in the alluvial aquifer lying along the river. Three other municipal water systems are located in the Raccoon River valley (West Des Moines, Fox Creek Water Co., and Southwest Polk Water Co.) as well as a reservoir to supplement flows in the River during low-flow conditions (Dale Maffitt Reservoir).

The study area is affected by two major dams on the Des Moines River, one forming the Saylorville Reservoir and the other forming Lake Red Rock. The latter is outside the study area, but its flood pool reaches into the southeast portion, and it receives nearly all the natural drainage from the study area. Big Creek Lake, created by a diversion dam to protect Polk City from flooding by Saylorville Lake, lies directly east of Saylorville Reservoir.

Nearly 70 percent of the total land area is used for agriculture and approximately 15 percent for urban uses. Fewer than 2,000 persons are employed in agriculture (approximately 1.5 percent of the total population). Approximately 33 percent of the work force is employed in services and government, 23 percent in trade and 19 percent in manufacturing.

The highly productive agricultural land in the study area is its most valuable natural resource and forms the basis of a large portion of the area's economic development. This land is also the source of troublesome water pollutants - particularly suspended and settleable solids, nutrients, pesticides and pesticide residues. Cost-effective control of these pollutants is one of the major challenges of this 208 study. Other major water quality problem areas are the economical collection and treatment of sanitary sewage from the urbanized area, the control and management of combined sewer overflows, and the control and management of stormwater runoff in urbanized and developing areas.

Climate

The climate of the central Iowa region is strongly seasonal due to its interior location on the continent. During winters, large masses of cold, dry air move in from the polar region; during summers warm, moist air from the Gulf of Mexico dominates the region. Occasionally, air masses from the Pacific Ocean move into central Iowa producing relatively mild, dry weather. Hot, dry winds from the southwestern desert region of the country occasionally bring desiccating conditions to the area.

Temperature

The mean annual temperature for the City of Des Moines is 51 degrees fahrenheit (11 celsius). Des Moines has approximately 30 days per year with maximum temperatures at or above 90 degrees and approximately 140 days

with minimum temperatures at or below 32 degrees. (See Table II-1.) The average duration of frost-free periods was between 165 and 186 days at four different measuring locations in the study area over approximately 20 years.

Relative humidity generally stays between 60 percent of saturation (p.m. readings) and 80 percent (a.m. readings).

Rainfall

Both frequency and intensity of rainfall in the Des Moines area increase markedly during the months of March through June. This is followed by a drop in July, slight increase during August and September and a gradual decrease until January and February. In 84 years there were eight years in which annual rainfall exceeded the mean rainfall by more than 10 inches and three years when the annual rainfall was more than 10 inches below the mean. (See Table II-2.)

Winds and Storms

The mean monthly wind speed in the Des Moines area varies from about nine mph (August) to 14 mph (March and April). The prevailing direction is northwest from November through April and south from May through October. Winds at 15 feet above the ground reach 50 mph (excluding gusts) about every other year and reach 75 mph once in 50 years.

Approximately 80 percent of 40-50 annual thunderstorms occur during the warm half of the year. Tornado frequency is highest in May and June and during afternoon and early evening hours.

Topography

The topography of the study area can be divided into two fairly distinct regions: (1) the area north of the line of the Wisconsin glacial advance which

Table II-1

MEAN, MAXIMUM AND MINIMUM MONTHLY TEMPERATURE*

<u>Month</u>	<u>Mean, °F.</u>	<u>Maximum</u>	<u>Minimum</u>
January	20.9	29.7	12.1
February	24.8	33.6	15.9
March	36.4	45.5	27.2
April	50.5	60.6	40.3
May	61.5	71.6	51.3
June	71.0	80.9	61.1
July	76.1	86.6	65.6
August	73.8	84.1	63.5
September	65.5	76.1	54.9
October	54.2	64.8	43.6
November	38.4	47.6	29.1
December	26.2	34.3	18.0
Annual	49.9	59.6	40.2

*Based on 64 years of records.

Source: Iowa DEQ, 1975a.

Table II-2

MEAN MONTHLY VALUES OF PRECIPITATION

<u>Month</u>	<u>Airport</u>	<u>City</u>
January	1.30	1.25
February	1.10	1.11
March	2.09	2.23
April	2.53	2.48
May	4.07	4.03
June	4.71	4.87
July	3.06	3.05
August	3.67	3.88
September	2.88	3.05
October	2.06	2.27
November	1.76	1.72
December	1.14	1.12
Annual	30.37	31.06

Source: Iowa Natural Resources Council, 1953.

is relatively rolling to undulating; and (2) the area south of the glacial line, which is rough and hilly. Elevations rise above 1,050 feet in Dallas County and fall to less than 750 feet along the Des Moines River in the southeast corner of the study area. The dominant features of the land are the Des Moines River Valley, a small portion of the Skunk River Valley and the stream valleys tributary to them. Slopes in the area rarely exceed 10 percent except along the valley walls.

There are 16 drainage basins in the study area - each divided into from 2 to 20 sub-areas. (See Plate II-1.) The subareas (103) are the basic units for data collection and analysis.

Geology

The City of Des Moines is located on the southernmost reach of the Cary substage of the Wisconsin ice sheet within the study area. East of the City the southern boundary swings gradually north and crosses the Polk County border south to Mitchellville. Approximately 12,000 to 13,500 years have passed since this glacier receded. The surface covered by the glacier is significantly different from that to the south, where the most recent glacial advance was the Kansan ice sheet. To the north of the demarcation line, the land forms are primarily glacial, and the surface is in extreme youth with respect to erosion and drainage patterns. The divides between adjacent streams have very little slope. The topography may be called "saucer topography" because of the shallow, rounded swales which often contain water and have no outlets. The ground between the swales appears as low, gently rounded hummocks. In this northern region, the drainage conforms to the hills -- it does not form them. The river valleys are generally quite narrow, although it is common for the present stream to be cut into the alluvial bottom of an older, larger valley.

South of the line of the Wisconsin glacial advance, the landscape is in early maturity with respect to erosion and drainage pattern. The land forms

DRAINAGE BASINS AND SUB-AREAS

- BASIN BOUNDARY
- SUB-AREA BOUNDARY
- 031 SUB-AREA CODE

SCALE IN MILES
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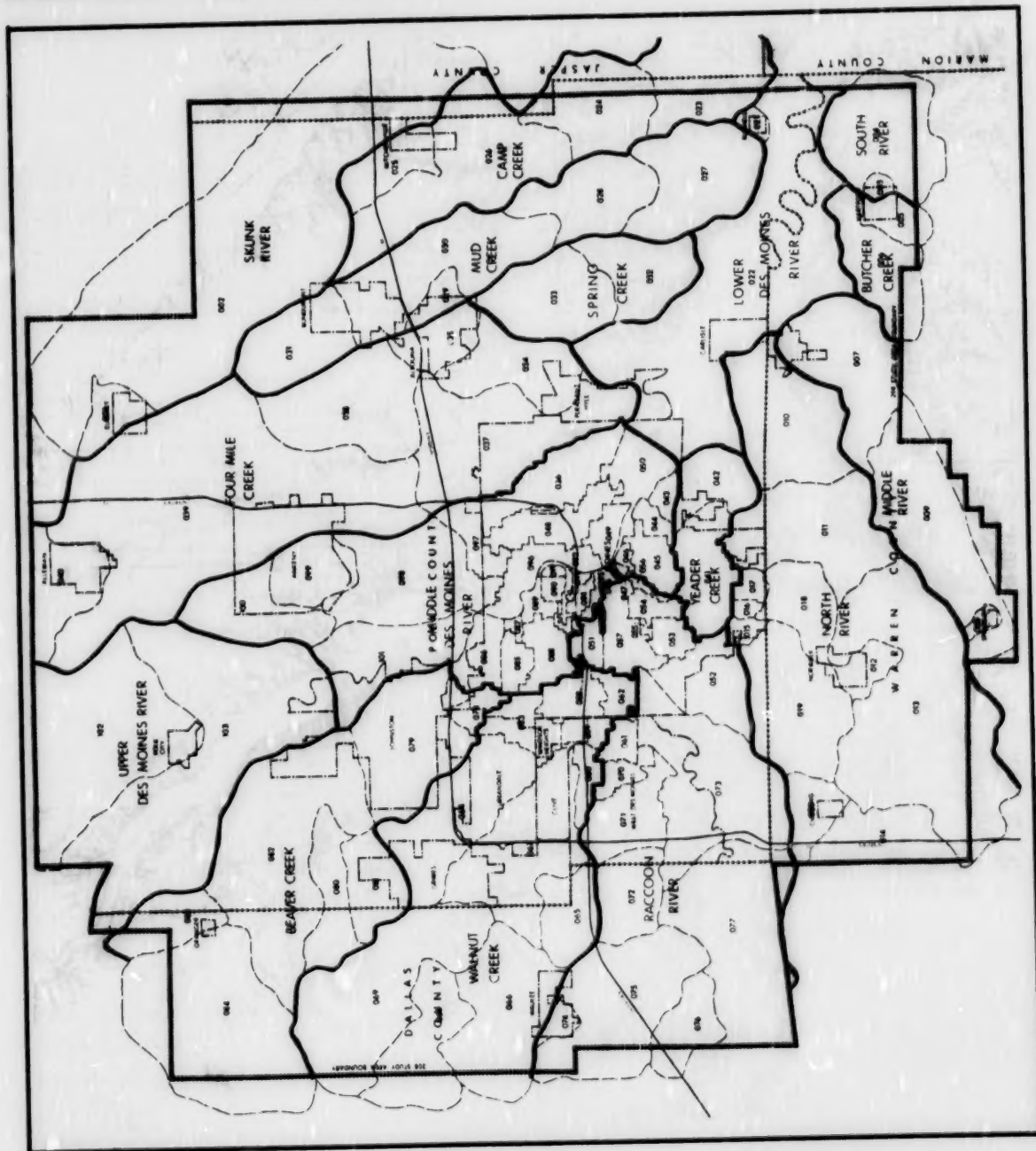


CENTRAL IOWA REGIONAL ASSOCIATION
OF LOCAL GOVERNMENTS

creb

KM
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are clearly those of stream action. River valleys are one to three miles wide, and there are a large number of tributary streams.

The superficial layer of substrate consists of loess and glacial and river deposits laid down during the Pleistocene. With very few exceptions, this superficial material is quite extensive throughout the study area and may attain depths of several hundred feet. South of the limits of the Wisconsin ice sheet, a thin veneer of loess covers the uplands. A layer of loess may be found under the Wisconsin structures in certain places to the north. The bedrock beneath the Pleistocene mantle consists of shale with interbedded limestones and sandstone and thin coal seams. The strata are generally quite horizontal. The bedrock throughout the study area is of the Des Moines series (Cherokee and Marmaton groups) in the Pennsylvania system. Rocks of lower geological strata can be found as outcrops sequentially to the northeast of the study area. A complete stratigraphic column for Iowa is provided for reference. (See Plate II-2.)

The greatest depth to bedrock based on data from well logs maintained by the Iowa State Geological Survey is 280 feet, in the extreme northern part of the study area near Alleman. This point lies over the pre-glacial "Jordan channel", which parallels the present Skunk River channel to the west and "rejoins" the Skunk River in the northeast corner of the study area. Another substantial buried, pre-glacial channel is that underlying the present course of the Beaver Creek. Both of these buried channels serve as substantial water storage areas and are fed by overlying unconsolidated material.

Significant alluvial aquifers of varying depth and widths line the following rivers and creeks: Des Moines River, Raccoon River, Skunk River, Middle River, Walnut Creek, Beaver Creek, and Four-Mile Creek. These aquifers are continuously recharged by natural storm runoff and are, therefore, sensitive to significant non-point sources of pollution in the respective watersheds.

11-9

STRATIGRAPHIC COLUMN OF IOWA

SYSTEM	SERIES	GROUP	FORMATION	DESCRIPTION	THICKNESS	(MILLION YEARS)
Quaternary	Pleistocene		Wisconsin	clay, gravel pit and moraine	500'	
			Illinoian	clay and gravel		
			Kansan	clay and gravel		
Cretaceous		Colorado	Carlisle	shale	340'	
			Grandblanc	limestone and shale		
			Graneros	shale		
Jurassic		Delaware	Fort Dodge beds	limestone and shale	300'	90
			Fort Dodge beds	limestone and shale		
Pennsylvanian	Virgil	Webb	French Creek	shale		
			Jim Creek	shale		
			Frederick	shale		
			Grandblanc	limestone		
			Dry	shale		
			Dove	limestone		
			London (includes Dayton Coal)	shale		
			Wagon	shale		
			Wagon	shale		
			Tarbo	limestone		
			Willard	shale		
			Elm	limestone		
			Harveyville	shale		
			Reading	limestone		
			Arthur	shale		
			Wesleyville	limestone		
			Snyder Creek	shale		
			Burlington	limestone		
			Silver Lake	shale		
			Rye	limestone		
			Cedar Vale	shale		
			(includes Elm bed of top)	shale		
			Happy Hollow	limestone		
			White Cloud	shale		
			Howard	limestone		
			Savery (includes roadway coal bed at base)	shale		
		Shawnee	Tappan	limestone		
			Colburn	shale		
			Dear Creek	limestone		
			Tacumseh	shale		
			Lecompton	limestone		
		Douglas	Kanawha	shale		
			Crest	limestone		
			Lawrence	shale		
			Stronger	shale		
			John	limestone		
		Lansing	Wesley	shale		
			Stanton	limestone		
			Vicksburg	shale		
			Wagon	shale		
			Wagon	shale		
		Kansas City	Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
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			Wagon	shale		
		Pleasanton	Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
		Des Moines	Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
Mississippian	Meramec		Wagon	shale		
			Wagon	shale		
	Osage		Wagon	shale		
			Wagon	shale		
	Kinderhook	North Hill	Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
Devonian	Upper	Yellow Spring	Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
	Middle		Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
Silurian	Niagara		Wagon	shale		
			Wagon	shale		
	Alexandrian		Wagon	shale		
			Wagon	shale		
			Wagon	shale		
Ordovician	Cincinnati		Wagon	shale		
			Wagon	shale		
			Wagon	shale		
	Mohawkian		Wagon	shale		
			Wagon	shale		
Cambrian	St. Croix	Traverse	Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
Precambrian			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		
			Wagon	shale		

While there was extensive coal mining in the Des Moines area earlier in this century, the prospects for commercial production returning in this area do not appear very high at the present. A statewide inventory of coal resources now in progress may shed more light on this matter (Avein, 1975).

A potential problem caused by the extensive coal mining activity earlier in this century is that much of south-central Polk County is underlain by shallow, mined out voids in the upper bedrock layers which represent possible subsidence areas. The incidence of subsidence to date is low, however, and the change of major subsidence appears to be very low.

Underground (bedrock) storage area for liquid petroleum gas (LPG) is located in Pleasant Hill with substantial storage volumes at depths of 500, 900 and 1,400 feet (Dorheim, 1975).

Data on the distribution of recent earthquakes and the map of seismic risk zones in the United States indicate that the probability of significant earthquakes or tremors in the study area is relatively small (Spencer, 1972; Cargo and Mallory, 1974). There are no known fault zones in the area along which tremors are likely to develop.

Soils

Soils in the study area, as a whole, are highly productive agricultural soils of Class I or II capability. Most of the land is slightly sloping with steeper slopes limited to the sideslopes of the larger river valleys. The following paragraphs describe the salient characteristics and general location of the major soil associations in the study area. Appendix A-1 provides more detailed information.

1. Clarion-Nicollet-Webster.

Much of the northern two-thirds of the study area is covered with these soils. They are highly productive for agricultural purposes and range in

drainage characteristics from well to poorly drained. The soils in this association, especially Clarion, produce some runoff from gently sloped areas. This association is the most intensively cropped in the area, with corn and soybeans being the major crops. Because of the large extent of seasonally bare soil, there is often the potential for considerable erosion. This potential is minimized by the absence of steep or long slopes. Generally, both erosion and deposition are quite local, from the morainal knolls to adjacent swales and potholes. Only fine clays and organic matter are apt to remain suspended in runoff long enough to be carried off the landscape and into streams and rivers.

2. Hayden-Lester.

These soils are found on the steeper slopes along major streams and occur along the Des Moines River north of the Racoon confluence and along the Skunk River. They are well drained, moderately productive and generate considerable runoff.

Soils in this association have the greatest erosion potential per unit area if mismanaged, due to their location on steep slopes and their erosive nature. Use of land having this soil association for woodlands and pasture minimizes the erosion problems, and small grains and hay are far better than row crops if it used for cropping.

3. Colo-Waukegan-Dickinson-Dorchester.

These soils are found on bottomlands or on benches along the Des Moines, Racoon, and Skunk Rivers. Formed primarily from outwash and alluvium, they are well drained, except for Colo, which is poorly drained. They have moderate agricultural productivity but are subject to flooding or standing water for parts of the year. These soils are not generally subject to erosion, but localized deposition and/or scouring may take place in times of flooding.

4. Fayette-Downs.

These loess soils occur on gentle slopes north of the Des Moines River in the southeast corner of Polk County. They are well drained, have high agricultural productivity and produce substantial runoff. They have considerable erosion potential if mismanaged because of their light, fine texture.

4A. Ladoga-Lindley.

Ladoga-Lindley soils are found south of the Des Moines-Raccoon confluence. These soils are formed in medium fine-textured loess and till on gently sloping to steep landscapes. Erosion is a hazard due to the frequency of steeper slopes. A fine, well integrated drainage network conveys sediments rapidly to streams. Woodland and pasture cover in this area would effectively mitigate the erosion hazard.

5. Tama-Muscatine.

These soils are formed in deep, medium-textured loess on nearly level and gently sloping landscapes. The area is intensively cultivated to row crops, which exacerbates its erosion potential, especially where slopes are in excess of five percent. Large fields with long gentle slopes may be subject to severe sheet and rill erosion during intense rains. Sediments are conveyed rapidly to drainageways and streams and removed from their points of origin.

5A. Sharpsburg-Shelby.

These soils are formed in medium fine-textured loess, moderately deep to shallow over paleosols (old soils) and in unweathered Kansas-aged glacial till. Erosion is only a moderate hazard except where they are exposed in row crop cultivation. Erosion hazard on paleosol exposures will be severe unless good plant cover can be maintained. The unweathered Kansas-aged till soils

will have a moderate erosion hazard, particularly since they have a greater frequency of steeper slopes. Permanent cover should be maintained on paleosol and till-derived soils in this area.

6. Sparta-Farrar-Chelsea.

These are very sandy soils found along the Upper Des Moines and Skunk Rivers. They are excessively drained, not highly productive, moderately sloped and produce considerable runoff. They are not particularly subject to water erosion except where there is concentrated runoff from above. In fact, deposition may even occur in areas near footslopes and where streams spread out on the terrace or on bottomlands. In large parts of this area where there are coarse-textured soils, wind erosion can be a particularly severe hazard. These soils are not used extensively for row crops.

Hydrology

Rainfall

The average rainfall in the study area is approximately 31 inches per year. An estimated 68 to 70 percent (or 21 to 24 inches) of this either evaporates from moist surfaces or is transpired by plants. This leaves seven to 10 inches, with up to six inches becoming surface runoff and approximately three inches entering the soil as infiltration (Twenter and Coble, 1965, p. 21).

Major Streams

The major streams in the study area flow southeastwardly through broad, pre-glacial valleys. The Des Moines River is the dominant one and lies at depths approximately 150 to 200 feet below the upland plain through the study area. It drains approximately 13,000 square miles in the State of Iowa and approximately 14,500 square miles totally (Iowa Natural Resources Council, 1953, p. 3).

The largest tributary of the Des Moines River is the Raccoon, an exception to the general southeasterly direction of flow of major rivers in that it enters the Des Moines River at a direction of slightly south of west. The other major tributaries of the Des Moines River in the study area are Beaver Creek, Four Mile Creek and Middle River. Walnut Creek is the principal tributary of the Raccoon River in the study area.

The average flow of the Des Moines River at Boone, Iowa northwest and outside of the study area is 1,603 cubic feet per second; 1,979 CFS at Des Moines above the confluence with the Raccoon River; and 3,781 CFS below the Raccoon River confluence. The Raccoon River increases from 1,197 CFS at Van Meter (west and outside the study area) to approximately 2,000 CFS at the Des Moines confluence.

The stream flow peaks on both rivers during the period of March through June and is at minimal values during September through January. Peak flows for the Des Moines River at Des Moines are approximately 5,000 CFS during late spring and minimum flows are under 1,000 during early winter.

Major streams in the Des Moines area have had a fairly frequent history of flooding. The flood of record for the Des Moines River and Raccoon River occurred in June, 1954 when river level at Des Moines reached 803.9 feet.

Reservoirs

Two man-made structures in the Des Moines area will strongly influence the hydrology of the Des Moines River and its tributaries: Saylorville Lake (dam is 213.7 miles upstream from the mouth), completed in April, 1977, and Lake Red Rock (dam is 142.9 miles upstream from the mouth), which became operational in 1969. Saylorville Lake has a conservation pool elevation of 833 feet, with a surface area at that elevation of approximately 5,400 acres (74,000 acre-feet capacity) extending 13 miles (17 river miles) upstream. At the flood control pool elevation of 890 feet, the Lake has a surface area of about 16,700 acres (562,000 acre-feet capacity) extending approximately 45

miles (54 river miles) upstream. The dam is designed to control flows from a drainage area of approximately 5,823 square miles and when operated in conjunction with the completed local flood control works will provide flood protection up to the level of the 165-year recurrence frequency. Saylorville Lake will alter the range in flow rates from 20 to 60,000 cfs to 200 to 21,000 cfs (U.S. Army Engineering Division, 1974, p. III-7).

Lake Red Rock is outside the 208 study area, but its hydrology and water quality are strongly affected by activities in the study area. The Lake covers approximately 9,000 acres at conservation pool elevation of 725 feet and 65,500 acres at flood control pool elevation of 780 feet. The flood pool extends well into the southeastern corner of the study area. Flood pool and conservation capacities are 1,740,000 and 90,000 acre-feet respectively.

The Des Moines and Raccoon River basins each have small lakes in them which originated either naturally as isolated meanders of the parent stream or as man-made lakes or both. They include Gray's Lake, Horseshoe Lake, Fisher Lake, Avon Lake, Randleman Lake and many unnamed gravel pits.

Big Creek Lake, created in 1972 by a diversion dam on Big Creek, was made to protect the Polk City area from flooding by Saylorville Lake. It has a surface area of 885 acres at normal pool elevation of 920 feet, and the flood pool is not expected to increase its elevation more than five feet.

Water Quality and Quantity

A discussion of water quality and quantity in the Des Moines 208 study area can be divided into three major areas, the Des Moines River, the Raccoon River, and other streams in the study area.

Water quality data from the Des Moines River Basin in Iowa has been compiled by the Iowa Department of Environmental Quality (IDEQ). There are seven sampling stations in the vicinity of the 208 study area. (See Table II-3.) Four stations are upstream of Des Moines, one station on the southern

edge of Des Moines, and two stations located downstream of Des Moines. The two downstream stations are located on either end of Red Rock Reservoir.

Table II-3
Location of IDEQ Reported Sampling Stations
 Des Moines, Iowa 208 Area

<u>Sampling Station No.</u>	<u>Location</u>
1	Boone Water Plant Des Moines River
2	Highway 89 Bridge 2 Miles West of Madrid
3	County Road Bridge 4 Miles West 2.5 Miles North of Polk City
4	Polk County Road 2 Miles South of Polk City
5	Highway 46 Bridge in Des Moines
6	Highway 14 Bridge at Red Rock Lake
7	1 Mile Downstream from Red Rock

The most intense sampling occurred between 1968 to 1974 when sampling was performed approximately weekly. Parameters covered by the stations submitting data include: dissolved oxygen, biochemical oxygen demand (BOD), organic nitrogen, nitrate, total nitrogen, orthophosphate, pH, temperature, turbidity, total hardness, total alkalinity and total carbon. Although there is insufficient data from these seven stations to allow a detailed analysis of the water quality of the Des Moines River in the area of Des Moines, there is ample data to indicate possible trends in the quality of water as it flows through the study area. Because the data from these stations along the Des Moines River is reported for only a few years and in no one year did all seven stations submit data, averaged values from the data of each station provide the water quality indication that is most useful.

Tables II-4 and II-5 present the mean summer and winter water quality values for the Des Moines River for 1968 through 1974. A brief discussion of several water quality parameters which greatly influence water quality in the Des Moines area follows:

Dissolved Oxygen - Examination of the dissolved oxygen data indicates that the Des Moines River contains an acceptable amount of dissolved oxygen. The oxygen saturation level for water at 20°C is 9.2 mg/l; at 5°C the saturation level is 12.8 mg/l. As the temperature of water rises, its ability to absorb or retain oxygen decreases.

From the summer water quality data, a rather large decline in the dissolved oxygen concentration occurs as the Des Moines River flows through the City of Des Moines. This decrease in the dissolved oxygen concentration may be partially related to a corresponding rise in water temperature which may be related to the use of river water for cooling purposes. (See Table II-4.)

Biochemical Oxygen Demand - The BOD levels of the Des Moines River are relatively low, 3 to 11 mg/l. The summer and winter data indicate the effects of Red Rock Reservoir on the BOD levels of the river. The reservoir allows for the settling of organic matter and results in lower BOD levels in water discharged from the reservoir.

pH - The pH of the Des Moines River is within the 6.5 to 9.0 standard range limit and fluctuates only slightly as it flows through this segment.

Ortho-phosphate - Ortho-phosphate levels in the river through the winter months are relatively stable except for a peak which occurred at

Table II-4

SUMMER WATER QUALITY OF THE DES MOINES RIVER
1968-1974

Des Moines, Iowa 208 Area

<u>Station</u>	<u>D.O.(mg/l)</u>	<u>BOD(mg/l)</u>	<u>Ortho PO₄(mg/l)</u>	<u>pH</u>	<u>Temp. °C</u>
1	10.21	8.66	.24	8.25	20.95
2	10.01	11.30	.20	8.23	21.35
3	9.80	10.51	.52	8.36	21.21
4	9.57	10.99	.18	8.29	21.04
5	8.45	7.27	.55	8.07	22.95
6	8.30	3.38	.36	8.06	21.32
7	9.47	3.44	.35	7.97	21.61

Heavy metals: occasional violation of State standards for cadmium, zinc and lead in lower Des Moines River.

Pesticides: DDE, DDT and dieldrin above recommended levels in many samples.

Table II-5

WINTER WATER QUALITY OF THE DES MOINES RIVER
1968-1974

Des Moines, Iowa 208 Area

<u>Station</u>	<u>D.O. (mg/l)</u>	<u>BOD(mg/l)</u>	<u>Ortho PO₄ (mg/l)</u>	<u>pH</u>	<u>Temp. °C</u>
1	13.22	6.77	.64	8.12	3.78
2	14.94	8.68	.64	8.12	3.47
3	13.60	9.14	.62	8.19	3.61
4	13.40	9.61	.54	8.03	3.71
5	12.43	6.01	.86	8.17	5.13
6	11.48	3.41	.46	7.97	4.75
7	13.87	4.17	.64	7.87	4.90

Station No. 5. This increase also occurred at Station No. 5 during the summer at the point where the river flows through the City of Des Moines past its confluence with the Raccoon River.

Temperature - Temperature levels of the Des Moines River are relatively stable and well below the 32°C stream standard limit. A temperature peak is reached at Station No. 5 in both the summer and winter.

Results of various studies have reported the water quality conditions in the Des Moines River. A study of the Des Moines River from Fort Dodge to Des Moines was completed during the summer of 1973 (Iowa State Hygienic Laboratory, 1974). Water quality was quite good during this study period as a result of high flow conditions. Dissolved oxygen levels ranged from 7.2 to 8.6 mg/l in June, 1973, and from 7.6 to 19.8 mg/l in August of that same year. BOD readings varied from 1 to 5 mg/l and from 5 to 16 mg/l during the same two-month time period. In addition, fecal coliform concentrations averaged 1,000/100ml. No ammonia nitrogen data were presented in this report.

Saylorville pre-impoundment studies from 1964 to 1970 (Bauman and Kelman, 1970, Bauman and DeBoer, 1972) on the Des Moines River have been carried out regularly by personnel at Iowa State University. BOD levels in the late summer of 1970 averaged 18 mg/l with orthophosphate generally present at a concentration below 0.5 mg/l. Ammonia nitrogen remained less than 1 mg/l except for January-February 1970 when the river was at the freezing point. Organic nitrogen varied from 0 to 3.02 mg/l during this study. Dissolved oxygen measurements showed variations from 15.9 mg/l in February, 1970 to a low of 5.8 mg/l in July, 1970.

The following year ammonia nitrogen levels varied from 0 to 2.88 mg/l as N. These ammonia nitrogen concentrations remained below 0.9 mg/l as N

except for just below Des Moines where concentrations were generally higher. Orthophosphate levels ranged from 0 to 3.9 mg/l but were usually below 1.0 mg/l. BOD levels indicated high values of around 30 mg/l in March, 1972 during the period of spring flooding. Fecal coliforms were found to be generally higher below the City of Des Moines.

A follow-up Saylorville area study (Bauman and Oulman, 1973) in 1973 detailed water quality conditions in the Des Moines River from Boone to Red Rock. A number of parameters were discussed in this pre-impoundment study. BOD levels varied from 0.2 mg/l below Red Rock to 18 mg/l at Saylorville in September, 1973. However, the normal BOD range of the Des Moines River was observed to be 2 to 7 mg/l. Dissolved oxygen concentrations were noted to be at a minimum (3.55 mg/l) in September, 1972 at Red Rock Reservoir. Maximum dissolved oxygen levels (23 mg/l) were observed at Boone in September, 1972. The minimum dissolved oxygen value coincided with the maximum turbidity reading, with maximum values occurring during periods of high algal activity.

Ammonia nitrogen concentrations on the Raccoon River varied from a low of 0.03 mg/l in October, 1972 to 1.0 mg/l in March, 1973. Ammonia nitrogen levels below the confluence of the Des Moines and Raccoon Rivers averaged somewhat higher than those at upstream stations on both rivers. Orthophosphate levels were lower in 1972-73 compared to 1971-72. The maximum orthophosphate concentration was 13 mg/l as PO_4^{3-} near the confluence of the Des Moines and Raccoon Rivers with a normal range of 0.2 to 0.6 mg/l.

Fecal coliform measurements made during this study were highest in the Raccoon River and directly downstream from the Des Moines wastewater treatment plant. Red Rock stations frequently detected no fecal coliform organisms. Fecal coliform averages in these three areas were 3,386/100ml, 4,346/100ml, and 153/100 ml.

The Raccoon River is the other major stream in the 208 planning area. The North Raccoon River has been the subject of many investigations in the past - particularly with reference to concentrations of dissolved oxygen and ammonia during the winter months below Storm Lake, Jefferson, Perry and Adel (Iowa Department of Environmental Quality, 1975b). No water quality violations have been observed on the Middle and South Raccoon Rivers during high flows. Low-flow periods have not, however, been sampled in the Middle and South Rivers. A pollution potential appears to exist for the entire reach of the river when flows approach the 10-year 7-day low flow value. Data in these studies have not revealed violations of the Iowa Water Quality Standards from Van Meter to Des Moines although a potential for pollution may exist (Iowa Department of Environmental Quality, 1975b).

Little data is available for the main stem of the Raccoon River through the study area. Some information is available in the Baumann studies (Baumann and Oulman, 1973) and has been discussed previously. Generally, water quality in this portion of the Raccoon River is very good because no point-source discharges are located there.

Various streams tributary to the Des Moines River flow through the 208 study area, including Beaver Creek, Walnut Creek, North River, South River, Middle River, Yeader Creek, Mud Creek, and Camp Creek. A small amount of water quality data is available regarding these streams (Iowa Department of Environmental Quality, 1975c). Turbidity has been noted as a problem in all of these rivers with a mean turbidity level of approximately 75 JTU (Jackson Turbidity Unit). Dissolved oxygen concentrations in these streams are usually well above Iowa stream standards, yet fecal coliform levels have been found to exceed the EPA guideline of 200/100 ml. Water quality data indicate poorer water quality in the Middle River than in the North or South Rivers, with best water quality in the North River.

Data describing the water quality of other tributary streams in the study area is minimal and no regular sampling programs have been initiated on these streams.

With regard to groundwater quality, alluvial deposits which underlie the Des Moines River are important sources of water. These deposits have a large storage capacity with frequent recharge from precipitation and groundwater aquifers. The bedrock aquifers in the area yield large quantities of water and are separated by relatively impermeable aquicludes. The water quality varies significantly from aquifer to aquifer. The important aquifers in the Des Moines River basin are the alluvial aquifers, Dakota sandstone, the St. Lawrence aquifer (up to 1000 gpm), lower Pennsylvania sandstone, the Jordan Aquifer (up to 1000 gpm), and Dresbach sandstone (less than 100 gpm). The Dakota sandstone yields moderate to large quantities (50-500 gpm) of somewhat mineralized water in the upper part of the basin. Pennsylvania sandstone is widespread but yields only small quantities of highly mineralized water. Mississippian limestones in Polk and Dallas Counties yield a few gallons per minute of water which is at least moderately mineralized and possibly high in fluoride (Iowa Department of Environmental Quality, 1975d).

Nearly all of Iowa's groundwaters are very hard (250-500 mg/l calcium carbonate equivalents). Alluvial aquifers offer good-to-fair quality water with underlying bedrock aquifers containing mineralized water. Water quality varies depending on the thickness of the aquifer, the depths of the wells, the underlying aquifer or aquiclude, and whether the water is coming from storage, induced infiltration, or from rainfall. Alluvial deposits usually contain water with less than 500 mg/l total dissolved solids. These groundwaters are of the calcium bicarbonate or calcium magnesium bicarbonate type.

A notable exception is the lower reach of the Raccoon River. Maps indicate that water from alluvial deposits under the river contains between 500 to 1,000 mg/l total dissolved solids (Iowa Department of Environmental Quality, 1975b).

Concentrations of 2,500 mg/l total dissolved solids with excessive fluoride from the Mississippian limestone and the Silurian-Devonian aquifer

are common in the Des Moines 208 planning area. Analyses from the Jordan aquifer show high fluoride concentrations west and southwest of Des Moines of 2.0 to 3.0 mg/l and total dissolved solids of 500 to 1,000 mg/l. In general, this water supply contains less minerals than other sources of groundwater from bedrock aquifers.

The City of Des Moines obtains its water from the sand and gravel alluvial aquifers of the Raccoon River. Maffit reservoir serves as a back-up supply which can be discharged to the Lower Raccoon River as needed. Groundwater from unconsolidated aquifers in the area is generally hard (200 mg/l as calcium carbonate) and the total dissolved solids level has on occasion exceeded 500 mg/l. Iron concentrations (0.3 mg/l) have been of concern in some localities in the area (Upper Mississippi River Comprehensive Basin Study Coordinating Committee, 1970).

The City of West Des Moines draws water from the Jordan aquifer and uses shallow wells for emergency supply. Certain underground gas storage facilities pump water from the St. Lawrence aquifer.

A partial analysis of water from bedrock formations in the state is illustrated in Table II-6 for comparison purposes. Other applicable data is shown in Table II-7.

Detailed reports of existing groundwater quality in the state do not exist to any great extent.

With regard to groundwater quality, there are various aquifers in central Iowa. The shallow aquifers in the Des Moines study area consist of irregular layers of unconsolidated rocks, silt, clay, sand and gravel. They may be subdivided into alluvial aquifers, buried channel aquifers and drift aquifers. Shallow aquifers are the water source for nearly 100 cities and communities

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Table II-6

REPRESENTATIVE PARTIAL ANALYSES OF WATER FROM BEDROCK FORMATIONS (All values in milligrams per liter)

Des Moines, Iowa 208 Area

<u>Location</u>	<u>Date of Sampling</u>	<u>Iron (Fe)</u>	<u>Bicarbonate (HCO₃)</u>	<u>Sulfate (SO₄)</u>	<u>Chloride (Cl)</u>	<u>Dissolved Solids</u>	<u>Hardness (as CaCO₃)</u>
Cretaceous Aquifer							
Estherville (Emmet Co.), Iowa	11/5/56	1.8	442	504	5.0	1,175	766
Pocahontas (Pocahontas Co.), Iowa	3/7/62	.36	525	553	15	1,300	820
Mississippian Aquifer							
Ft. Dodge (Webster Co.), Iowa	10/4/51	.9	481	218	5.0	728	552
Sigourney (Keokuk Co.), Iowa	8/3/60	.02	398	75.7	19	531	380
Silurian-Devonian Aquifer							
Cedar Falls (Black Hawk Co.), Iowa	6/14/60	.06	264	42.4	2	308	252
Edgewood (Clayton Co.), Iowa	8/16/52	.96	283	10	2.0	288	270
Northwood (Worth Co.), Iowa	7/13/61	3.2	410	13.0	3	377	337
Near Volga (Clayton Co.), Iowa	9/4/51	.2	378	31	7.0	376	333
Cambrian-Ordovician Aquifer							
Belleville (Dane Co.), Wise.	12/29/44	0	381	6.4	3.8	292	330
Charles City (Floyd Co.), Iowa	6/14/60	.22	283	41.2	7	326	256
Fairfield (Jefferson Co.), Iowa	8/14/60	.20	298	455	129	1,146	340
Ft. Dodge (Webster Co.), Iowa	10/5/51	1.2	436	192	89	779	479
Galesburg (Knox Co.), Ill.	1/9/46	.5	0	559	215	1,399	279
Iowa City (Johnson Co.), Iowa	11/27/62	.52	283	554	54	1,167	470
Jefferson (Greene Co.), Iowa	12/8/60	5.93	312	418	97	1,048	234
Madison (Dane Co.), Wise.	2/2/61	.1	405	73	16	476	434
Oregon (Ogle Co.), Ill.	7/16/48	.3	0	15.2	6.0	286	292

Source: Upper Mississippi River Comprehensive Basin Study, 1970.

Table II-7

REPRESENTATIVE PARTIAL ANALYSES OF WATER FROM UNCONSOLIDATED AQUIFERS
(All values in milligrams per liter)

Des Moines, Iowa 208 Area

<u>Location</u>	<u>Date Of Sampling</u>	<u>Iron (Fe)</u>	<u>Bicarbonate (HCO₃)</u>	<u>Sulfate (SO₄)</u>	<u>Chloride (Cl)</u>	<u>Dissolved Solids</u>	<u>Hardness (as CaCO₃)</u>
Near Barnum (Webster Co.), Iowa	12/28/46	4.1	410	247	6.5	756	488
Boone (Boone Co.), Iowa	6/15/60	.24	373	96.1	18	550	412
Cedar Rapids (Linn Co.), Iowa	10/24/61	9.9	351	105	28	494	412
Dubuque (Dubuque Co.), Iowa	2/26/60	.52	334	17.5	9	326	313
Eddyville (Wapello Co.), Iowa	11/02/61	.16	215	92.0	1	352	266
Erie (Whiteside Co.), Ill.	11/16/60	Tr	0	28.0	2	246	178
Lee (Lee Co.), Ill.	10/04/47	.4	0	2.5	2.0	240	149
Marengo (Iowa Co.), Iowa	11/05/59	.71	222	54.3	6	321	236
Near Oregon (Dane Co.), Wise.	4/18/60	.05	290	18	5.5	0	266
Rockford (Winnebago Co.), Ill.	6/10/48	2.7	0	56.0	9.0	402	400
Sigourney (Keokuk Co.), Iowa	8/30/60	2.06	234	86.4	18	380	220
Near Stoughton (Dane Co.), Wise.	4/19/60	.2	344	31	14	0	332
Vinton (Benton Co.), Iowa	12/27/60	2.46	288	15.6	1	273	244
Waterloo (Black Hawk Co.), Iowa	6/22/60	.06	239	26.5	5	280	240
West Des Moines (Polk Co.), Iowa	9/03/63	4.0	321	94.0	6.5	457	344

Source: Upper Mississippi River Comprehensive Basin Study, 1970.

in central Iowa. The Des Moines Water Works water supply is obtained from shallow alluvial aquifers along the Raccoon River through infiltration galleries recharged directly from the river. They also supply individual users in locations not having municipal systems. Shallow aquifers generally yield moderate to large quantities of water. However, there is considerable variation in both the yield and the quality of water drawn from these aquifers.

Aquifer recharge areas for surficial aquifers are generally found directly over or very near the aquifers themselves. Recharge of bedrock aquifers often will take place by way of alluvial channels passing over the bedrock aquifers or parts of them. Regions of rock outcropping may also indicate a recharge area by direct connection with surface water sources.

Cities and towns in the study area which have bedrock wells include Altoona, Ankeny, Grimes, Granger, Waukee and West Des Moines. Bondurant, Norwalk and Waukee use water from upper bedrock aquifers and are therefore, somewhat more susceptible to polluted recharge.

Water Quality and Quantity Problems

Identification of existing water quality and quantity problems has been partially discussed in previous sections. Various studies have indicated additional problems reported in the form of water quality violations.

Water quality violations have been observed from Des Moines to Red Rock Reservoir. Data obtained in 1968 when renovation of the main Des Moines treatment plant was taking place indicated dissolved oxygen, ammonia nitrogen, and fecal coliform violations.

The significance of this information should be considered in light of the Saylorville dam. Projected flows at Des Moines will be at a minimum of 200

cfs as opposed to the 10-year 7-day low flow of 82 cfs. Surveys in 1968, 1973, and 1974 have reported on water quality in this segment of the river. Few violations have taken place, and those that have occurred primarily in 1968. High concentrations of ammonia nitrogen were found in conjunction with low levels of dissolved oxygen.

Fecal coliform violations have also been noted in 1973 and 1974, as well as in previous years, below the City of Des Moines. Disinfection at the Des Moines Wastewater Treatment Plant has been instituted and should help to alleviate fecal coliform violations. However, some background level of fecal coliforms will always occur below Des Moines from non-point sources and bypasses.

A water quality survey of the Des Moines River at Des Moines in 1970 (Iowa State Hygienic Laboratory, 1970) focused on three major stations within the city limits, as well as the Highway 14 bridge station, 39 miles downstream from the Des Moines Wastewater Treatment Plant. Relatively elevated flow conditions of the Des Moines River were sampled during this study with minimum sampled flows of 250 cfs during February 1968, 550 cfs in February 1970, and 250 cfs in September 1970. The sampling dates were chosen to represent different seasons of the year.

Organic and nitrate-nitrogen concentrations were observed to be increased slightly by the Des Moines Wastewater Treatment Plant effluent, especially during periods of low flow. The concentrations of these parameters also varied substantially in the Des Moines and Raccoon Rivers upstream from the Des Moines Wastewater Treatment Plant discharge and were dependent upon river flow, algal blooms, etc.

Ammonia-nitrogen concentrations were definitely increased by the Des Moines Wastewater Treatment Plant effluent. Although the limit of 2.0 mg/l specified by the Iowa Water Quality Standards was not exceeded in the Des Moines River, concentrations as high as 1.9 mg/l were observed in January

and 1.5 mg/l in September. As would be expected, there was a substantial seasonal variation in ammonia-nitrogen levels with concentrations approaching 1 mg/l in winter and spring above Des Moines. However, during the warmer months ammonia-nitrogen concentrations were generally below 0.1 mg/l. During the winter months the increased ammonia-nitrogen concentrations persisted to the headwaters of the Red Rock Reservoir.

Soluble and total phosphate concentrations in the Des Moines River were substantially increased by the discharge of the Des Moines treatment plant and these elevated concentrations persisted to the headwaters of the Red Rock Reservoir. The decreases in phosphate levels which occurred between the Iowa Power and Light Company (IPALCO) and Highway 14 station indicated some assimilation by the periphyton or attached growth as well as the possible dilution effect which may occur in this stretch of the river because of IPALCO's discharge.

In addition to the information presented above (Iowa State Hygienic Laboratory, 1970), physico-chemical data were collected and reported on September 3rd and 8th, 1970 while the Des Moines and Raccoon River flows were 290 and 270 cfs, respectively, which are relatively low-flow conditions.

The September 3 data indicated that water quality in the Des Moines and Raccoon Rivers above the wastewater treatment plant was acceptable. Bacterial levels were low, dissolved oxygen concentrations were above the required 5 mg/l level, and ammonia-nitrogen and phosphate levels were low. The results from the analysis of the water sample collected at the railroad bridge about one mile downstream from the wastewater treatment plant were indicative of a waste discharge upstream. This was evidenced by increased fecal coliforms, ammonia-nitrogen and phosphate concentrations. The analysis of the IPALCO sample demonstrated the effects of the Des Moines wastewater treatment plant on the Des Moines River. While the water

quality standard for ammonia-nitrogen was not violated in the Des Moines River, concentrations as high as 1.6 mg/l were observed. Fecal coliform concentrations had increased from 2,300 to 16,000 and total phosphate concentrations had increased sevenfold.

The September 8, 1970 data substantiate the data in the September 3 study and demonstrate how far downstream these water quality changes persist. Ammonia-nitrogen concentrations decrease downstream but at the Highway 14 bridge sampling stations concentrations are still considerably higher than normal summer levels. Phosphate concentrations also slowly diminish downstream but are still substantially higher than normal at the Highway 14 station which is 39.3 miles below the Des Moines Wastewater Treatment Plant outfall. Fecal coliform numbers were reduced to normal ranges within 20 river miles of the wastewater treatment plant.

Dissolved oxygen data secured during this water quality survey were based on sampling performed during the early morning hours (5:00 to 8:00 AM) of September 3, 5, and 8, 1970. This time of day was chosen because dissolved oxygen levels are expected to be minimal at this time due to elevated respiration of algae and other microorganisms. On all three occasions dissolved oxygen levels above the Des Moines Wastewater Treatment Plant were above the Iowa minimum standard. However, on September 3 there was only one dissolved oxygen reading above 4.0 mg/l over a 16 mile stretch below the plant outfall with a low of 2.6 mg/l recorded 10 miles downstream from the discharge. On September 5 all of the dissolved oxygen readings for a 16 mile stretch below the wastewater treatment plant were below the 4.0 mg/l minimum standard with recovery occurring approximately 21 miles downstream from the discharge. On this date the low dissolved oxygen reading was again 2.6 mg/l occurring about 9 miles downstream from the Des Moines discharge. The profile of the dissolved oxygen concentrations in the Des Moines River on September 8 is generally higher than those of September 3 and 5; however, the 4.0 mg/l dissolved oxygen absolute minimum standard was still violated nine miles downstream of the Des Moines treatment facility discharge.

Decreases in dissolved oxygen concentrations were observed in the summer of 1973 at Runnells and the Highway 14 bridge below Des Moines with little change noted at other times of the year (Iowa (State) Department of Health, 1934). BOD levels during this period were approximately 5 mg/l. These data clearly indicate that the discharge of the existing Des Moines wastewater treatment facility combined with intermittent and other point sources can reduce the dissolved oxygen level of the river below acceptable levels, particularly under low-flow conditions.

Problem Areas

Reported problem areas indicate that the Des Moines Wastewater Treatment Plant is a major point-source discharger in the study area. There are numerous other municipal and industrial dischargers in the area which tend to add to the overall pollutional problems, but not nearly to the extent that the main Des Moines plant presently does. One major discharger which may cause potential water quality and quantity problems is the Iowa Power and Light Company, as previously described, which withdraws a large quantity of water from the Des Moines River and discharges cooling water.

Water Uses

Water consumption in the 208 area is expected to increase from 33,500,000 to 57,000,000 gallons per day by the year 2000. (See Table II-8.) The projected figures are based on the assumption that the daily average for each land use category stays constant between 1975 and 2000. A one percent per year increase in water consumption in all land use categories would result in a total projected consumption in 2000 of approximately 71,000,000 gallons per day instead of 57,000,000 gallons per day.

The City of Des Moines draws its potable water from alluvial aquifers along the lower Raccoon River. Dale Maffit Reservoir, located at the

Table II-8

AVERAGE DAILY WATER CONSUMPTION

1975

<u>Intensity Development Cat.*</u>	<u>Acres</u>	<u>Ann. Daily Avg. (gal./ac./day)</u>	<u>Consumption (gal./day)</u>
1. R-LD	6,763	245	1,656,900
2. R-MLD	7,970	320	2,550,400
3. R-MHD	13,820	750	10,365,000
4. R-HD	2,253	1,385	3,120,400
5. NR-LIU	5,525	985	5,442,100
6. NR-LIUS	780	1,410	1,099,800
7. NR-MIU	4,359	795	3,465,400
8. NR-HI	210	27,895	5,858,000
Total	41,680		33,558,000

(33,558,000 gals./day ÷ 315,000 persons = 105 gals./person/day)

PROJECTED DAILY WATER CONSUMPTION

2000

<u>Intensity Development Cat.*</u>	<u>Acres</u>	<u>Ann. Daily Avg. (gal./ac./day)</u>	<u>Consumption (gal./day)</u>
1. R-LD	10,885	245	2,666,800
2. R-MLD (12,252)	33,755	320	3,920,600
3. R-MHD (24,503)		750	18,377,300
4. R-HD	4,995	1,385	6,918,100
5. NR-LIU	10,512	985	10,354,300
6. NR-LIUS	2,311	1,410	3,258,500
7. NR-MIU	8,946	795	7,112,100
8. NR-HI	149	27,895	4,156,400
Total	74,553		56,764,100

(56,764,100 gals./day ÷ 400,000 persons = 140 gals./person/day)

Table II-8 (Continued)

***R-LD:** Residential, low density (less than one dwelling per acre).

R-MLD: Residential, medium low density (1 to 2.9 dwellings per acre).

R-MHD: Residential, medium high density (3-6.9 dwellings per acre).

R-HD: Residential, high density (seven or more dwellings per acre).

NR-LIU: Non-residential, low intensity/urban (retail shops, warehouses).

NR-LIUS: Non-residential, low intensity, special (hotels, motels, offices, laundries, etc.).

NR-MIU: Non-residential, medium intensity (manufacturing, hospitals, schools, bottling and cannery plants).

NR-HI: Non-residential, high intensity (downtown offices, hotels, etc.).

meeting point of Polk, Warren, Dallas and Madison Counties, was created as a backup supply. The water level in the reservoir is maintained by pumping from the Raccoon River during good flow conditions. Under low flow, water would be released from the reservoir to enhance stream flow on the lower Raccoon. (The Reservoir receives very little runoff.)

Surficial aquifers are also used as water sources by Elkhart, Polk City, Grimes, Johnston and Mitchellville (Twenter and Coble, 1965, p. 42). Cities and towns in the study area which have bedrock wells include Altoona, Ankeny, Bondurant, Grimes, Norwalk, Runnells, Waukee and West Des Moines (well logs maintained by Iowa Geological Survey, Iowa City).

Withdrawal of water from the lower Raccoon alluvial aquifers by the City of Des Moines Waterworks is roughly equal to all other withdrawals in the study area (40 to 50 cfs). While the supply of groundwater throughout the study area appears to be quite adequate in relation to projected use, protecting the water quality in the Raccoon River and its tributaries should continue to receive very high priority.

Water Quality Management

Federal agencies involved in planning for water quality include the Corps of Engineers and the U.S. Soil Conservation Service. The Corps, in cooperation with other Federal, State and local agencies engages in comprehensive, basin-wide studies such as assessment of flood control needs, major drainage, irrigation and supply and quality control of potable water sources.

The Soil Conservation Service gives technical assistance to land owners in matters related to soil and water conservation. This service is provided through Iowa Department of Soil Conservation and soil conservation districts organized under State laws.

State agencies (other than Iowa Department of Soil Conservation) involved in water quality planning include the Department of Environmental Quality (DEQ), the Natural Resources Council and the Office of Planning and Programming. The DEQ has the power and responsibility to develop comprehensive plans and programs for the prevention, control and abatement of new, increasing, potential or existing water pollution. The DEQ develops complete river basin plans for the purpose of guiding all water quality management efforts in the respective basin. This basin planning process is a continual one - updated constantly for changes in population, industrial activity and state of the art in water quality management techniques.

The Natural Resources Council is responsible for the comprehensive state-wide plan to control, utilize and protect water resources of the State. A member of the Natural Resources Council officially represents the State of Iowa on all water resource planning efforts affecting Iowa water resources. The Council grants all permits for withdrawal of water for public consumption or industrial use.

The Office of Planning and Programming coordinates the development of physical, economic and human resource programs to promote the efficient and economic utilization of Federal, State, local and private resources.

Responsibility for water quality monitoring and surveillance in the 208 study area lies with the U.S. Environmental Protection agency, the Corps of Engineers, the Department of Environmental Quality, and local governments. Currently the Corps of Engineers is conducting a sampling program at Saylorville Lake by means of a contract with Iowa State University. The purpose of the program is to monitor river and lake water quality conditions and to relate physical, chemical and biological changes to physical river and lake characteristics as well as the operational changes connected with the Saylorville Dam project. The United States Geological Survey, under contract with the Iowa Natural Resources Council, is conducting a monitoring program in the Walnut Creek Basin to determine flow rates during high-flow conditions.

The State DEQ has primary responsibility for water quality monitoring and surveillance. Its principal management tool is the State Operation Permit Program, carried out in coordination with the National Pollutant Discharge Elimination System (NPDES). The permit provides for discharge effluent limitations in prescribed compliance schedules. The DEQ also conducts on-site plant inspections to verify self-monitoring reports and compliance with permit stipulations.

Municipalities and counties have power to provide drainage systems for flood and other surface waters, sewage systems and wastewater treatment plants. They also have the authority to require and regulate connections to existing sewer systems.

Flood Hazards

The flood hazards in parts of the 208 study area have been very high - particularly along the Raccoon and Des Moines Rivers and along Walnut and Fourmile Creeks. The completion of Saylorville Reservoir will significantly lessen the flood hazard throughout the area. The impact of alternative release rates on downstream conditions is given in a detailed technical report (U.S. Army Engineer District, Rock Island, 1975).

Des Moines is an eligible community under the National Flood Insurance Act. Planning and other studies are now underway to develop a flood management program consistent with the requirements of the Act.

While the completion of Saylorville Reservoir and certain aspects of the developing areawide flood management plan will certainly affect water quality and water quantity problems throughout the 208 study area, the proposed 208 plan will not significantly increase or decrease flood hazard. The proposed intermittent-point and non-point control strategies will have a small effect of decreasing runoff and immediate discharge to area streams, thereby lessening flood flows.

BiologyRare/Endangered Species

An interim list of endangered vascular plants (90 species), birds (six species), mammals (eight species), reptiles and amphibians (eight species) and fish (eight species) have been prepared for the State of Iowa under the auspices of the State Preserves Advisory Board. (See Appendix A-2 for complete species lists.) Not all species on these interim lists are found in the Des Moines area, but many would have potential habitat areas in it.

Wildlife species become endangered when their native habitats are either destroyed or altered significantly. Of the 90 endangered plant species, approximately 40 percent require wetland habitats (including bogs, wet meadows and standing water); approximately 30 percent require wooded sites; and approximately 30 percent require either dry, exposed sites or prairie sites. Wooded sites have always been limited, and agricultural development has been especially disruptive to wetland and prairie sites in the area. (Many, approximately two-thirds, of the endangered plant species in the State are near the western and/or southern limit of their known natural geographical range (Fernald, 1950), and may therefore be more sensitive to habitat disruption than non-marginal species.)

Wildlife Habitats.

There are three principal types of wildlife habitats in the study area: aquatic, semi-aquatic (or wetland) and terrestrial.

The major aquatic habitats are Big Creek Lake, Saylorville Lake (to be completed in Spring, 1977), Dale Maffit Reservoir, Des Moines River and various natural and artificial impoundments in its floodplain, Raccoon River and various natural and artificial impoundments in its floodplain, Skunk River, North and Middle Rivers, Beaver Creek, Walnut Creek and Four Mile Creek.

Semi-aquatic or wetland habitats include Brenton Slough south of Granger, the old stream channel of Skunk River (part of which is now included in the Chicaqua Wildlife Area) and various temporary ponds in the floodplains of the Raccoon and Des Moines Rivers.

Terrestrial habitats are scattered throughout the study area along river and stream valleys. Some important examples are the land between Big Creek Lake and Saylorville Lake, floodplain and side-slope forest areas along the Des Moines River northwest and southeast of the City, Jester County Park, Walnut Woods State Park and Denman Woods along the Raccoon River, Margo Frankel Woods State Park, Thomas Mitchell County Park, Banner Mine State Park and the Dale Maffit Reservoir park area. One privately owned prairie remnant is located in the north-central part of the study area.

Natural, Terrestrial Vegetation and Associated Animals

The forests in the study area are a part of the eastern deciduous forest type and are near its western limit (Braun, 1961). Probably less than one-half of the original forest cover is left today. Woodlands lie principally along rivers and streams. They are most commonly found on sloping ground or in the floodplains of the larger rivers. The native vegetation of flatter upland sites was that of prairie, with the strong possibility that fires either were started in many instances to control the encroachment of prairies by forest development or that such fires did so naturally (Curtis, 1959).

Three major plant community types can be recognized in the study area. The first is the oak-hickory association found on upland, drier sites and dominated by bur oak, white oak, red oak, shagbark hickory and butternut hickory. This association is found on hilltops or south-facing slopes. Understory species commonly found in this association are dogwood, serviceberry, buckrush, gooseberry and chokecherry. Animals using this forest association for at least part of their feeding and nesting requirements

include several species of mice, squirrels, deer, fox, racoons, salamanders, toads, doves, chipmunks, titmice, warblers, woodpeckers, owls and vultures.

The maple-basswood association is dominated by bur oak, northern red oak, basswood (linden), black maple and sugar maple. The association is found on moist, well-drained sites generally on north- and east-facing slopes. Understory species include dogwood, ironwood and buckrush. Animals using this association for their habitat are not separable (at least on the basis of information now available) from those using the oak-hickory association.

The floodplain-bottomland association is dominated by hackberry, black walnut, elm, ash, boxelder, willows and cottonwood. It is found on land immediately adjoining river and stream channels or their gravel deposits. Red mulberry, greenbriar, virginia creeper and elderberry are found in the understory. Animals found in this association include nuthatches, warblers, starlings, sparrows, woodpeckers, quail, hawks, frogs, salamanders, snakes, toads, fox, squirrels, opossums and racoons. Where the forest continues, this association gradually merges into the intermediate and upland associations.

Wetland Vegetation and Associated Animals

Wetland areas are found in the floodplains of the larger rivers and streams in the study area, along the edge of larger lakes and reservoirs and in poorly drained depressions. Dominant plant species are rushes, sedges, cattail, arrowhead, willows, sycamore and cottonwood. These wetland areas are used by many bird and animal species, including migratory species. Year-round residents include beaver, muskrat, mink, mallards, teals, wood ducks and lesser scaups. Migratory birds include Canada geese, blue and snow geese, and diving and dabbling ducks (Bellrose, 1968).

Terrestrial Animals Occupying Forest Edge and Open Habitats

While many of the animals mentioned above in connection with the major forest associations also use forest edge and open habitats, the following

species are more uniquely associated with forest and edge habitats: rabbit (cottontail), woodchuck, bobwhite quail, ring-necked pheasant, ground squirrels, plains pocket gopher, western harvest mouse, prairie vole and meadow vole.

Aquatic Plants

Phytoplankton is the dominant component of aquatic vegetation in the rivers, streams, lakes and reservoirs of the study area. Rooted aquatics are often found near water edges or in shallow, slow moving water bodies. The most important component of phytoplankton communities are diatoms (principally Cyclotella, Navicula and Synedra). Blue-green algae (principally Oscillatoria) and green algae (Scenedesmus) are often present but seldom dominant (Kilkus et.al., 1975). Populations of aquatic plants fluctuate seasonally and with water quality and channel flow characteristics.

Aquatic Animals

Dominant fish in Lake Red Rock, Des Moines and Raccoon Rivers and their tributaries are carp, river carpsucker, black crappie, black bullhead, bigmouth buffalo and channel catfish. Other fish species include walleye (stocked), bluegill, sunfish, northern pike (stocked), largemouth bass (stocked), goldfish, yellow bass, white sucker and yellow perch (U.S. Army Engineer District, Rock Island, 1975). Dominant invertebrates include caddis flies, mayflies, mosquitoes, midges, stoneflies, crayfish, dragon flies and damselflies.

Crops and Managed Vegetation

The study area contains some of the most productive agricultural land in the United States. In 1973 there were 281,505 acres of farmland in Polk County with an average farm size of 209 acres and 31,311 acres of pasture

(Iowa Crop and Livestock Reporting Service, 1975). Warren and Dallas Counties have 334,914 and 352,521 acres of farmland respectively with average farm sizes of 230 and 164 acres. The three major crops are corn, soybeans and oats. Other crops include sorghum, wheat, rye, hay and seed crops for hay species. Acreage and yields for the three primary crops in 1974 are shown below:

		<u>Acres</u>	<u>Bushels/Acre</u>
Corn	Polk County	121,200	83.7
	Warren County*	72,500	72.9
	Dallas County*	152,400	79.6
Soybeans	Polk County	83,100	24.7
	Warren County*	52,800	23.0
	Dallas County*	99,700	28.4
Oats	Polk County	11,600	44.7
	Warren County*	7,500	43.9
	Dallas County*	5,200	56.7

Source: Iowa Crop and Livestock Reporting Service, 1975.

*Less than one-third of the land area in these counties is included in the study area.

Air Quality

The major sources of air pollution in the study area are motor vehicles and fossil fuel-burning power plants (Iowa Department of Environmental Quality, 1973, p. 21-44). For this reason downtown Des Moines, parts of eastern and northeastern Des Moines and the airport area are and will continue to be problem areas. Fugitive dust, largely from unpaved roads and other heavily used, unpaved areas, is also causing problems. All of Polk County is currently included in a "maintenance plan area" for carbon monoxide and suspended particulates. (The exact nature of control provisions is yet to be determined.)

Economic and Population Trends

Employment projections utilized in the 208 study call for employment to increase from 142,000 in 1975 to 180,500 in 2000. (See Table II-9.) The projections are based on two sources of information: the Real Estate Research Corporation's study prepared for the City of Des Moines and CIRALG, and the employment projections contained within the OBERS' Series E projections. These projections are described by major non-agricultural employment categories below.

1. Manufacturing. Manufacturing employment would increase, but not as rapidly as employment as a whole. As a percentage of total non-agricultural employment, manufacturing employment would decrease from 18 percent to 16 percent by the year 2000.
2. Construction. Construction employment would show a modest increase by the year 2000, with a significant increase in employment in Dallas and Warren Counties as population growth increases in these areas.
3. Transportation and Public Utilities. Employment in this category would continue to show no significant change, although small increases would occur in Dallas and Warren Counties, consistent with population increase.
4. Retail and Wholesale Trade. Employment in this category would continue to increase as rapidly as employment as a whole. This would result in an increase of over 25 percent in retail and wholesale trade employment by the year 2000.
5. Finance, Insurance and Real Estate. This category is also expected to show a significant increase, and at a rate greater than for

Table II-9

FUTURE EMPLOYMENT BY MAJOR EMPLOYMENT
CATEGORY IN THE 208 AREA

Major Employment Category	Employment (1,000's)			
	<u>1975</u>	<u>1980</u>	<u>1990</u>	<u>2000</u>
Manufacturing	26.0	27.0	28.3	29.7
Construction	6.7	6.9	7.7	7.9
Transportation & Utilities	10.0	9.9	10.1	10.1
Retail & Wholesale Trade	36.2	37.4	41.4	45.8
Finance, Insurance and Real Estate	16.2	16.9	19.1	21.4
Services & Miscellaneous	26.1	28.0	33.1	39.2
Government	<u>20.8</u>	<u>21.2</u>	<u>23.5</u>	<u>26.3</u>
Total	142.0	148.9	163.2	180.5

Source: Real Estate Research Corp., 1973.

employment as a whole, totalling 12 percent of non-agricultural employment by the year 2000.

6. Services and Miscellaneous. Service employment is expected to continue to show the highest rate of increase of any category, growing by 50 percent by the year 2000 and replacing manufacturing as the second largest employment category.
7. Government. Governmental employment would continue to keep pace with total employment and population increase, resulting in a gain of nearly 25 percent by the year 2000.

Population projections for the 208 area estimate population to increase from 315,000 in 1975 to 400,000 in 2000. These projections were made following review of a variety of existing and relatively recent population studies and a review of regional and local trends. The projected 2000 population of 400,000 is considered to be reasonably conservative, since it is less than the OBERS Series E Projection of 414,000, a benchmark projection utilized for water quality planning.

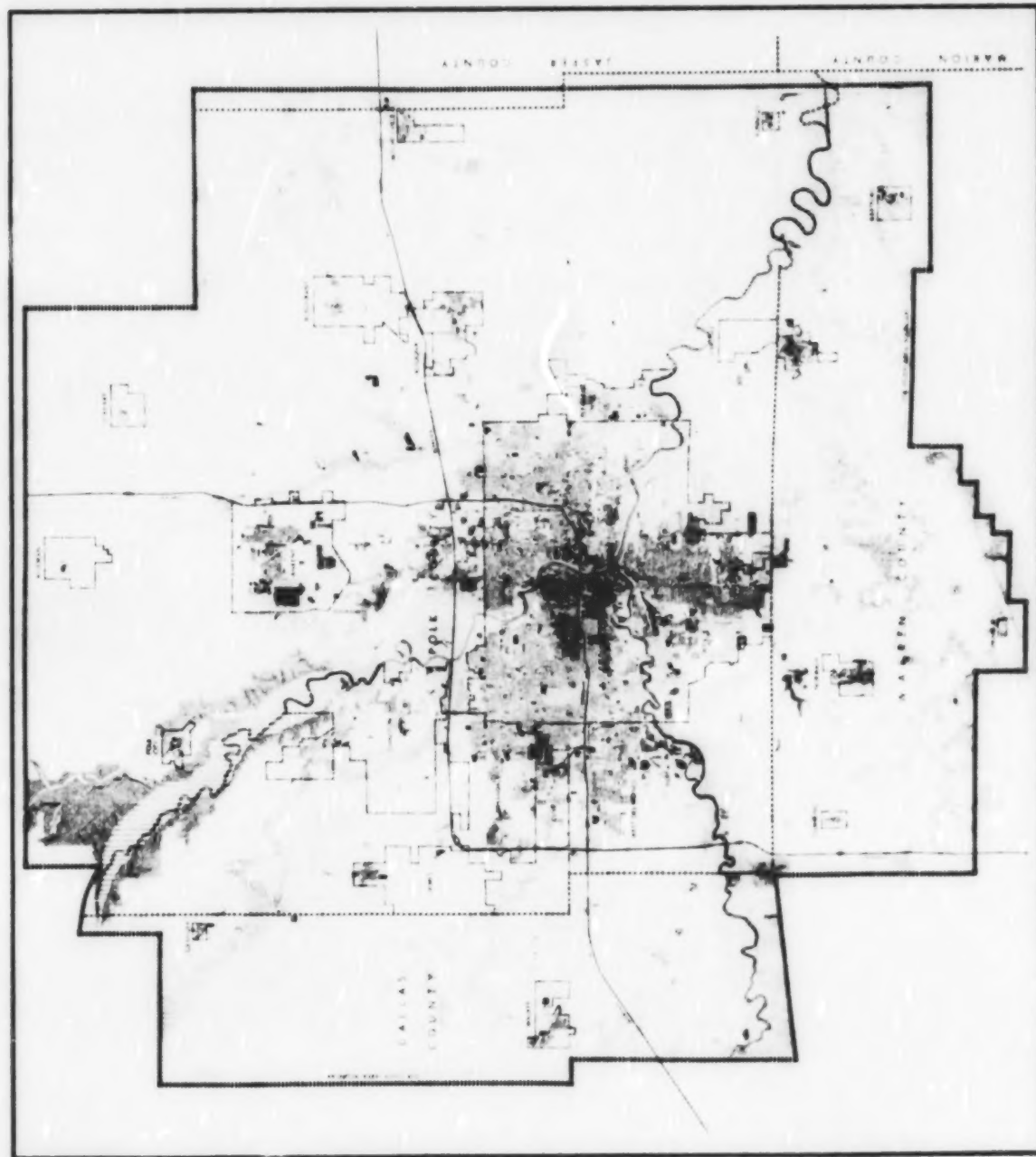
Land Use

Existing Land Use

Existing land use data for the Des Moines 208 area were described by 13 categories of land use based on the relationship between intensity of uses and wastewater generation.

Major concentrations of urban development within the study area consist of: (1) urban center including Des Moines and adjacent suburban communities; (2) a number of free-standing satellite cities outside the urban center; and (3) smaller cities located beyond the satellite cities. (See Plate

11-45



LAND USE 1975

- RESIDENTIAL - LOW DENSITY
(LESS THAN 1 DU/ACRE)
- RESIDENTIAL - MEDIUM DENSITY
(1 TO 60 DU/ACRE)
- RESIDENTIAL - HIGH DENSITY
(7 OR MORE DU/ACRE)
- NON-RESIDENTIAL
LOW INTENSITY
- NON-RESIDENTIAL
LOW INTENSITY (SPECIAL)
- NON-RESIDENTIAL
MEDIUM INTENSITY
- NON-RESIDENTIAL
HIGH INTENSITY
- CROPLAND
- PASTURE, FOREST & VACANT
- PERMANENT OPEN SPACE
- WATER
- FLOOD PLAIN

SCALE IN MILES



Central Iowa Regional Association
of Local Governments

KIRKHAM MICHAEL AND ASSOCIATES
HARLAND BATHOLMEW AND ASSOCIATES
AMERICAN CONSULTING SERVICES, INC.
TENECH ENVIRONMENTAL CONSULTANTS,
INC. - CARLETON D BEH AND COMPANY

PREPARATION OF THIS MAP WAS FINANCED THROUGH A GRANT FROM THE
U.S. ENVIRONMENTAL PROTECTION AGENCY UNDER FEDERAL TITLE 40 OF THE
FEDERAL WATER POLLUTION CONTROL ACT, AMENDMENTS OF 1972

II-3.) The area outside the urban center is predominantly agricultural land interspersed with bands of pasture and forest lands.

Quantitatively, the overall pattern of existing land use within the study area is dominated by non-urban uses with cropland accounting for nearly 70 percent of the present use. (See Table II-10.) Urban uses account for less than 10 percent of the total acreage.

Land Use Trends

The general development trends that are occurring in the 208 area consist of: (1) development of suburban areas, primarily to the west of the City of Des Moines; (2) development of satellite cities surrounding Des Moines such as Ankeny, Altoona and Bondurant; and (3) the development of areas oriented to Interstate 35-80 around the edge of the Des Moines urban center.

The following development trends for land use sectors are occurring:

1. Agriculture. Almost all the county which is not in urban development is utilized for agriculture. As urban development takes place (and as speculative land investment in advance of development takes place), land is removed from agriculture and put in a transitional holding state or is developed. This is occurring primarily on the suburban fringe areas and on the fringe areas of developing satellite cities.

2. Residences. Most residential development is taking place in the following two areas: (1) the western suburbs of the urban center such as West Des Moines and Urbandale, and (2) the satellite cities such as Ankeny, Bondurant, Altoona and Norwalk. Some residential development is also taking place in the unincorporated area, particularly in the corridor between Ankeny and Des Moines and the corridor between Des Moines and Altoona. Only

Table II-10

LAND USE - 1975

<u>Land Use Category</u>	<u>Acres</u>
1. Residential-Low Density (Less than 1 dwelling per acre)	6,763
2. Residential-Medium Low Density (1-3 dwellings per acre)	7,970
3. Residential-Medium High Density (3-7 dwellings per acre)	13,820
4. Residential-High Density (over 7 dwellings per acre)	2,253
5. Non-Residential-Light Intensity	5,525
6. Non-Residential-Light Intensity (Special)	780
7. Non-Residential-Medium Intensity	4,359
8. Non-Residential-High Intensity	210
9. Street	15,892
10. Cropland	350,850
11. Pasture, Forest and Vacant	78,730
12. Permanent Open Space	19,253
13. Water	<u>6,437</u>
Total	512,842

Source: Taken from land use prepared by individual communities,
aerial photos and field checks by CIRALG and HB&A.

limited residential development is occurring in the outlying rural cities. Within the central urban complex land uses of fairly high intensity have been locating on the upper limits of water sheds creating problems in sanitary sewer capacities where these were built to serve lower parts of these water sheds a number of years ago.

3. Recreation Lands. All units of government are participating in the development of recreational lands. The Federal government (Corps of Engineers) is developing Lake Red Rock and Saylorville Lake. The State operates two parks (Walnut Woods and Margo Frankel Park) and is developing recreational resources at Big Creek Reservoir. Many communities are acquiring or reserving land along the major rivers (as a part of their open space program) using federal funds. Also, individual communities are purchasing and developing parks to serve their local residents. Programs to provide publicly owned open spaces along the Des Moines and Raccoon Rivers are of particular significance.

4. Commerce. Very little retail commercial development is taking place in the Des Moines Central Business District, although some offices are being built. The majority of retail and office commerce is being developed at suburban locations throughout the metropolitan area. In many cases this commercial development consists of shopping centers or strip commercial along major streets. Commercial development is taking place at locations along I-35-80 also. In the satellite cities, commercial development is occurring along with residential development. In many cases the outlying commercial development is in the upper parts of watersheds.

5. Industry. Most new industry is locating in planned industrial districts in the urban center where utility service is available along with good transportation connections. With I-35-80 and I-235 being the major elements of the transportation system in the 208 area, much of the industrial development is locating in close proximity to one of these highways. These sites are at a considerable distance from any location for a central waste treatment plant.

Land Use Planning

The Intensity Development Pattern (Land Use Plan) for the Des Moines 208 area was selected following consideration of a number of alternatives designed to highlight water quality options. The pattern reflects a projected year 2000 population of 400,000 persons for the 208 area.

The Intensity Development Pattern was based on a continuation of present policies of the individual local governmental jurisdictions as reflected in their land use plans and zoning regulations, as adjusted to reflect areawide trends and realities.

The resultant development pattern bears a general resemblance to current urban patterns within the 208 study area. The urban "core" area centered upon the City of Des Moines remains the major urban concentration with the major extensions of growth generally occurring to the west and north. The first ring of communities surrounding the urban "core" would become increasingly urbanized and in some cases urban development along corridors between the "core" and outlying communities would be intensified.

Future growth in the area would be primarily located in the urban "core" and in incorporated outlying communities. Within the urban "core", Des Moines and Windsor Heights would increase in population by approximately eight percent while the western suburbs (Clive, Urbandale and West Des Moines) would increase from their already substantial population base by 35 to 45 percent, and Pleasant Hill would add substantially to its smaller existing population. The "core" area as a whole would attract nearly 50 percent of the total growth in the 208 study area. (See Table II-11.)

All outlying communities would have substantial development, accounting for approximately 40 percent of the total growth. The largest growth would occur in communities to the north and east of Des Moines (especially

Table II-11

ANTICIPATED POPULATION TRENDS

Des Moines, Iowa 208 Area

	1975 Estimated Population	1975-2000 Estimated Population	1975-2000 Population Change
<u>Des Moines Urban Area</u>			
Des Moines	199,000	215,000	+16,000
West Des Moines	22,000	32,000	+10,000
Urbandale	17,000	26,000	+ 9,000
Windsor Heights	6,500	7,000	+ 500
Clive	5,500	8,000	+ 2,500
Pleasant Hill	2,550	5,000	+ 2,450
Sub-Total	252,550	293,000	+40,450
<u>Cities in Metro Area</u>			
Ankeny	13,000	22,000	+ 9,000
Altoona	4,150	11,000	+ 6,850
Carlisle	2,750	4,000	+ 1,250
Johnston	2,500	7,500	+ 5,000
Norwalk	2,300	4,500	+ 2,200
Waukee	1,800	3,300	+ 1,500
Mitchellville	1,500	2,500	+ 1,000
Bondurant	1,250	3,000	+ 1,750
Grimes	900	3,000	+ 2,100
Granger	850	1,200	+ 350
Polk City	850	1,200	+ 350
Hartford	600	800	+ 200
Runnells	350	700	+ 350
Elkhart	250	350	+ 100
Cumming	200	300	+ 100
Spring Hill	130	150	+ 20
Alleman	100	200	+ 100
Sub-Total	33,480	65,700	+32,220
<u>Major Unincorporated Areas</u>			
Saylor Township	3,900	9,500	+ 5,600
Delaware Township	2,300	3,300	+ 1,000
Bloomfield	2,300	3,500	+ 1,200
Greenfield Plaza	1,500	2,000	+ 500
Lakewood	1,200	1,500	+ 300
Lovington	1,000	2,500	+ 1,500
West Bloomfield	500	600	+ 100
Sub-Total	12,700	22,900	+10,200
<u>Balance of 208 Metro Area</u>			
Rural Non-Farm Remainder of 208 Area	7,470	11,800	+ 4,330
Rural Farm Remainder of 208 Area	8,800	6,600	2,200
Total	315,000	400,000	+85,000

Johnston, Ankeny, Altoona and Bondurant); somewhat less growth would occur in outlying communities outside of the urban "core" area to the south and west.

The unincorporated urban areas to the north and northeast of Des Moines (Saylor and Delaware Townships) would attract growth as part of developing urban corridors connecting Des Moines and the outlying "satellite" communities. Additional growth in Saylor Township would be generated by the prospect of recreational development adjacent to the Saylorville Reservoir. Growth in unincorporated areas not now urbanized would be drastically limited, although some shift in population from rural farm residence to rural non-farm residence would be expected. This would result in additional development in some unincorporated areas such as those adjacent to the Saylorville Reservoir and in hilly areas southeast of Des Moines.

South of Des Moines the trend in development in unincorporated areas would continue to be primarily low-density residential uses along major roads or in hilly areas unsuitable for cultivation. Total growth in the unincorporated areas would be approximately 12,000 persons, of which 80 percent would be in urbanized areas; the increase in rural non-farm population would be offset to some extent by continued loss in rural farm population.

Extent and Effectiveness of Current Land Use Planning

Land use planning is a broad term and represents many activities and actions on the part of a community. For this analysis, the comprehensive plans, zoning regulations and subdivision regulations have been used as evidence of a local government's role in land use planning.

Twenty of the 26 local jurisdictions, including the three counties, have a comprehensive plan, ten of which were adopted in 1970 or later. (See Table II-12.) Six of the jurisdictions are presently in the process of updating or

Table II-12

STATUS OF LAND USE PLANNING

	<u>Date of Comprehensive Plan</u>	<u>Zoning Ordinance</u>	<u>Subdivision Regulations</u>
1. Alleman	1974	*	*
2. Altoona	1974	X*	X
3. Ankeny	1974	X	X
4. Bondurant	1968*	X	X
5. Carlisle	1969	X	X
6. Clive	1962*	X	X
7. Cumming			
8. Des Moines	1963*	X	X
9. Elkhart			X
10. Granger			
11. Grimes		X	
12. Hartford		X*	X
13. Johnston	1973	X	X
14. Mitchellville	1971	X	X
15. Norwalk	1969*	X*	X*
16. Pleasant Hill	1972	X	X
17. Polk City	1973	X	X
18. Runnells	1972	*	X
19. Spring Hill			
20. Urbandale	1971	X	X*
21. Waukee	1968*	X*	X*
22. West Des Moines	1968	X	X
23. Windsor Heights	1970	X	X
24. Dallas County	1963	X	X
25. Polk County	1957*	X	X
26. Warren County	1961	X	X

* Indicates an update or study currently being undertaken or considered.

Source: CIRALG.

refining their plans. These plans formed the basis for the areawide Intensity Development Pattern adopted for the 208 Plan. A major factor in the plans relative to water quality is a widespread concern about the maintenance of the floodway and adjacent flood-fringe areas along major streams (and to some extent along lesser tributaries) by almost all jurisdictions, and particularly Clive, Urbandale, Des Moines and West Des Moines.

Twenty of the 26 political subdivisions have zoning regulations and seven are in the process of preparing regulations or revising existing regulations. As would be expected, the ordinances vary from quite complex to relatively simple and their utilization relative to community goals and their administration varies as well.

Twenty-one of the jurisdictions have subdivision regulations and four are preparing new or revised regulations. Most of the regulations are standard in format and content. One jurisdiction has an ordinance requiring control of soil erosion during construction.

Any evaluation of effectiveness of land use planning is relative. Land use planning in the Des Moines 208 is similar to that in much of the midwest. The largest city, Des Moines, has a sizable planning staff, and planning is an important part of municipal policy. Most of the suburban communities place a significant reliance on planning and zoning. Some of the smaller, more rural communities utilize planning while others do not. Those municipalities without staff may utilize (and many do) the resources of the regional agency (CIRALG) which has a sizeable planning staff.

Administrative and Regulatory Land Use Controls Now In Effect

Both of the basic land use controls, zoning and subdivision regulations, were mentioned in the previous section. A number of zoning techniques in the area have an impact on water quality, and these are described below:

1. Floodplain Regulations. Ten of the 26 jurisdictions have floodplain regulations as a part of their ordinance. These regulations limit development within the broad floodplain to open space uses such as agriculture and parks.

2. Planned Unit Development (PUD) Regulations and Site Plan Review. Eight of the jurisdictions utilize planned unit development regulations in their ordinances. These are of a variety of types from a broad PUD to planned residential requirements. All require a site plan, development plan or some other type of mechanism in the review process. In several instances site plan review extends beyond the PUD process to major commercial or industrial projects. Site plan review for individual uses is limited. Effect on water quality is a consideration but not a major one in the review process.

3. Buffer Zones. A number of the ordinances identify buffer zones or open space requirements. Generally, these are expressed in terms of standards for various developments, although the West Des Moines ordinance has specific buffer zone requirements.

4. Permits. All of the ordinances require permits as an administrative enforcement procedure.

Other regulations besides zoning and subdivision regulations include the following:

1. Building Codes. Most of the jurisdictions (18) have and enforce a building code and have in-house inspection staff.

2. Septic Tank Regulations. All three counties regulate location of septic fields through their Boards of Health. In each case, a permit is required, soil porosity tests must be made, and locational criteria must be met.

3. Soil Loss Limits Regulations. The three soil conservation districts (Polk, Warren and Dallas Counties) in the Des Moines 208 Study Area have set soil loss limits in their districts pursuant to the conservancy district law. The soil loss limits are site-specific and are expressed for each soil type in terms of tons per acre per year lost from erosion using the Universal Soil Loss Equation as a guide. Maximum allowable soil loss is in the vicinity of five tons per acre per year.

Theoretically administration of the regulations occurs in the following manner: Soil erosion can be declared a nuisance if it results in or contributes to damage to any internal improvement of a conservancy district or damage to property other than that of the owner or occupant of the land on which such erosion is occurring. In either of these instances, action may be brought by: (1) the Commissioners of the Soil Conservation District within which the erosion occurs; (2) the owner or owners of any property so damaged; and (3) the Board of the Conservancy District whose internal improvement is damaged. Complaints are filed in writing with the Soil Conservation District. The District Commissioners then investigate the complaints and determine if soil loss limits are being violated. Notice of the Determination is given to the owner or owners alleged to be in violation, and voluntary abatement of the nuisance is sought. In case voluntary abatement does not take place, an Administrative Order is issued by the District Commissioners to the parties found to be in violation and they are advised as to the action required. Generally, this will consist of preparation of an erosion control plan and the following of practices in line with this plan to limit erosion. If the owner or owners fail to initiate the necessary conservation work within the time requirement, the District Court may be petitioned by the Commissioners to issue a court order to obtain immediate compliance. If the owner or owners do not comply they may be found in contempt of court and so punished.

The present experience with the soil loss limits regulations is limited but growing. Since passage of the law and determination of the soil loss

limits, five complaints have been filed which were settled out of court. Many other problems have been solved prior to the filing of formal complaints.

Aspects of Development Trends That
Might Cause Adverse Environmental Effects

It is unlikely that any of the land development trends in the Des Moines 208 Area would significantly affect air quality. Control of industrial emissions (which is good at the present time), emission controls on internal combustion engines, and control of "fugitive dust" from unpaved surfaces will be the major factors in air quality.

If development continues as at present and if major sewer system improvements are not made, adverse environmental conditions which presently exist will continue. These would include: (1) overloading of sewers from continuing development; (2) continued pollution from septic tanks in unincorporated areas of the county such as the corridor between Ankeny and Des Moines; (3) adverse effects on Saylorville Reservoir (when completed) from urban development oriented to it; (4) adverse impacts on water quality from expanding satellite centers with inadequate sewage treatment facilities; and (5) adverse effect from urban development in the lowlands of the Raccoon River or the Des Moines River.

In addition to the above, a major environmental effect of the continued development will be the loss of agricultural land and agricultural products as a result of removing high productivity agricultural lands from agricultural production. (See Plate II-5.)

Environmentally Sensitive Areas

Sources of Potable Water

The potable water source supplying the greatest number of people in the study area is the lower Raccoon River and the alluvial aquifer system

associated with it. At the present time approximately one-half of the water is taken from the River directly and one-half is taken from infiltration galleries buried in the aquifer (Johnson, 1976). Back-up facilities include the Dale Maffitt Reservoir, at the Polk, Warren, Dallas and Madison County intersection, which is charged by pumpage from the Raccoon River during favorable flow conditions and discharged to the River under low flow conditions. The other back-up system is a set of infiltration galleries emplaced along the Des Moines River near the Raccoon confluence.

There are over 100 wells in use throughout the study area, one-half of which penetrate to maximum depths of 400 feet below the surface. Approximately one-third have depths of 400-500 feet with the remaining wells deeper than 500 feet (data from well logs filed by Iowa Geological Survey). Contamination of these wells by surface pollutants (such as nitrates, for example) is a constant threat to shallow wells in agricultural land areas. Deeper wells drilled in the urban areas for industrial use are less threatened by surface contamination.

Surface Waters

Saylorville Lake, Lake Red Rock, Dale Maffitt Reservoir and the Lower Raccoon River are the four most sensitive surface water resources in the study area. While Lake Red Rock is not in the study area per se, it is and will continue to be strongly influenced by the effectiveness of the overall water quality management in the study area.

The two man-made lakes (actually reservoirs) collect waterborne soil, nutrients and pesticides from agricultural land areas - particularly cropland. If the rate of input from one or more of these parameters continues to be high, eutrophication and/or aquatic life kills could increase and cause major problems in the future. Lake Red Rock is also the primary sink for sediment and stable toxic compounds released from the urbanized land areas in the

study area. The wildlife and recreation of both Lakes depend critically on the year-round maintenance of good water quality.

Wetlands

Brenton Slough (on Beaver Creek), parts of the Chienqua Wildlife Preserve (old channel of the Skunk River) and various shallow and temporary pools in the floodplains of the Des Moines and Raccoon Rivers are the most significant wetland areas.

Floodplains and Flood Retention Areas

The floodplain of the Lower Des Moines River is included in the 100-year flood retention basin for Lake Red Rock. (See Plate II-4.) Floodplains for the Raccoon River, Middle River, Four Mile Creek, Beaver Creek and Walnut Creek represent significant flood retention capacity in their respective basins and will cause increasing damage if developed for urban uses.

Groundwater Recharge Areas

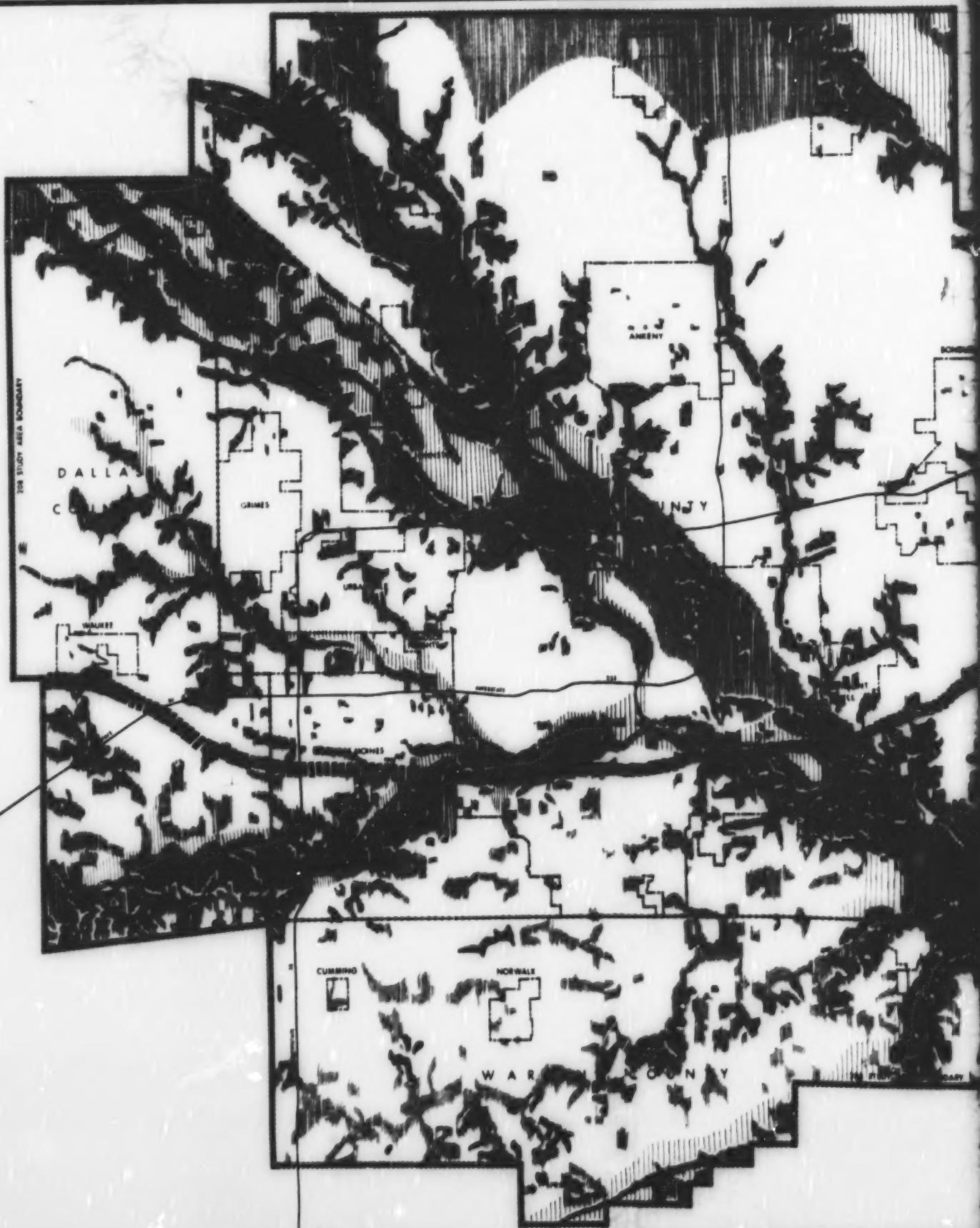
The most significant groundwater recharge areas in the study area overlie the alluvial aquifers along the major rivers and streams. (See Plate II-4.)

Steeply Sloping Lands

These areas are limited to the sideslopes of the major river valleys. (See Plate II-4.)

Prime Agricultural Lands

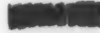
(See Plate II-5.)



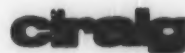
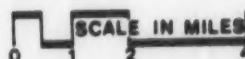
11-59

PLATE II-4

MAJOR ENVIRONMENTALLY SENSITIVE AREAS

-  FLOOD-PRONE AREAS
-  SURFICIAL AQUIFERS
-  BURIED CHANNEL AQUIFERS
-  STEEP SLOPES (14% AND OVER)
-  PASTURE, FOREST AND VACANT LAND
-  GENERAL LOCATION OF SOUTHERN LIMIT OF WISCONSIN GLACIER

SOURCES: U.S. ARMY CORPS OF ENGINEERS,
U.R.G.S., HARLAND BARTHOLOMEW & ASSOCIATES

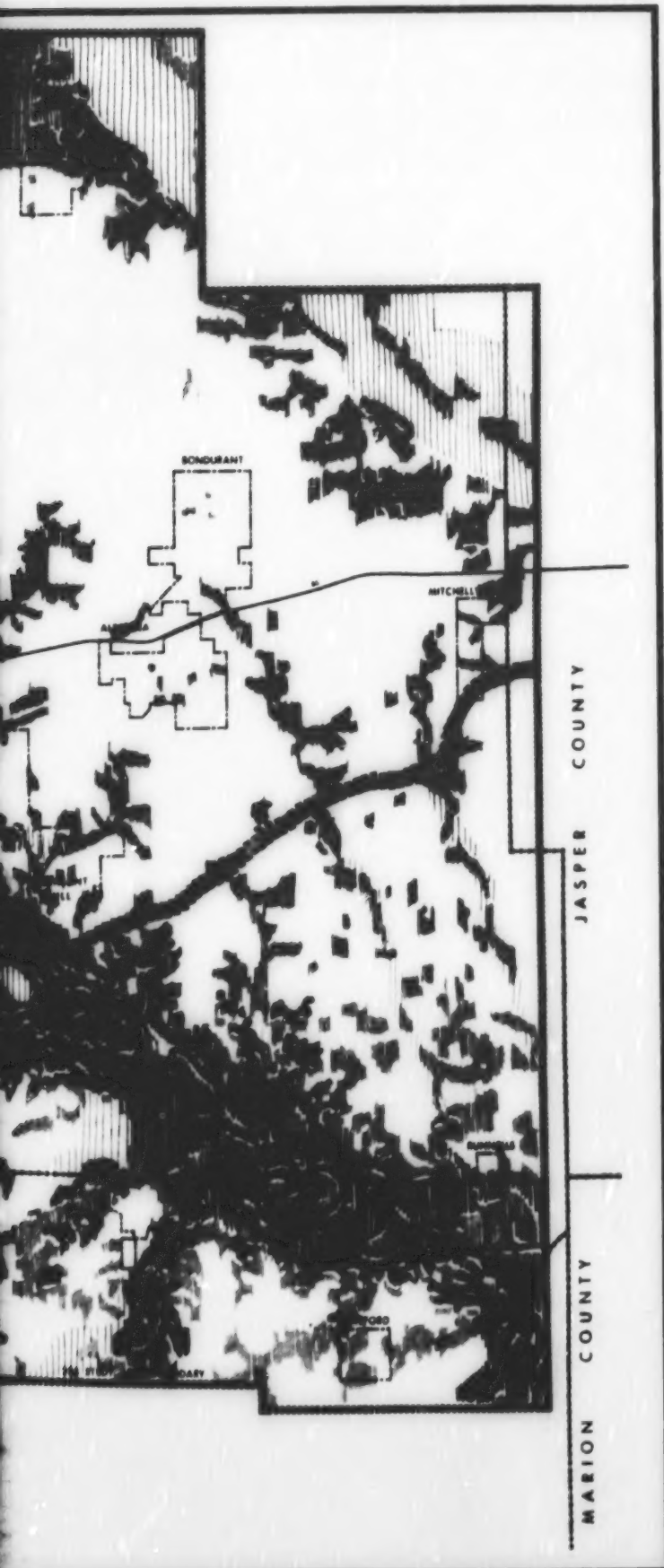


CENTRAL IOWA REGIONAL ASSOCIATION
OF LOCAL GOVERNMENTS



KIRKHAM MICHAEL AND ASSOCIATES
HARLAND BARTHOLOMEW AND ASSOCIATES
AMERICAN CONSULTING SERVICES, INC.
TENECH ENVIRONMENTAL CONSULTANTS,
INC. • CARLETON D BEH AND COMPANY

PREPARATION OF THIS MAP WAS FINANCED THROUGH A GRANT FROM THE
U.S. ENVIRONMENTAL PROTECTION AGENCY UNDER SECTION 208 OF THE
FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972



LAND CAPABILITY FOR AGRICULTURAL USE

CLASS I AND CLASS II CAPABILITY
 SOILS WITH NO LIMITATIONS FOR CROPPING OR
 SOIL LIMITATIONS WHICH REDUCE THE CHOICE OF
 CROPPING METHODS (INDICATION IN PARENTS)

CLASS III TO CLASS VIII CAPABILITY
 SOILS WHICH HAVE LIMITATIONS THAT REDUCE
 THE CHOICE OF CROPPING METHODS OR WHICH
 ARE SUITABLE FOR SOME, BUT NOT ALL, CROPPING
 METHODS AND SOILS WHICH ARE NOT
 SUITABLE FOR CROPPING

NOTE: SOIL CAPABILITIES ARE NOT SHOWN FOR
DEVELOPED AREAS

SOURCES: U.S. DEPARTMENT OF AGRICULTURE,
SOIL CONSERVATION SERVICE

SCALE IN MILES

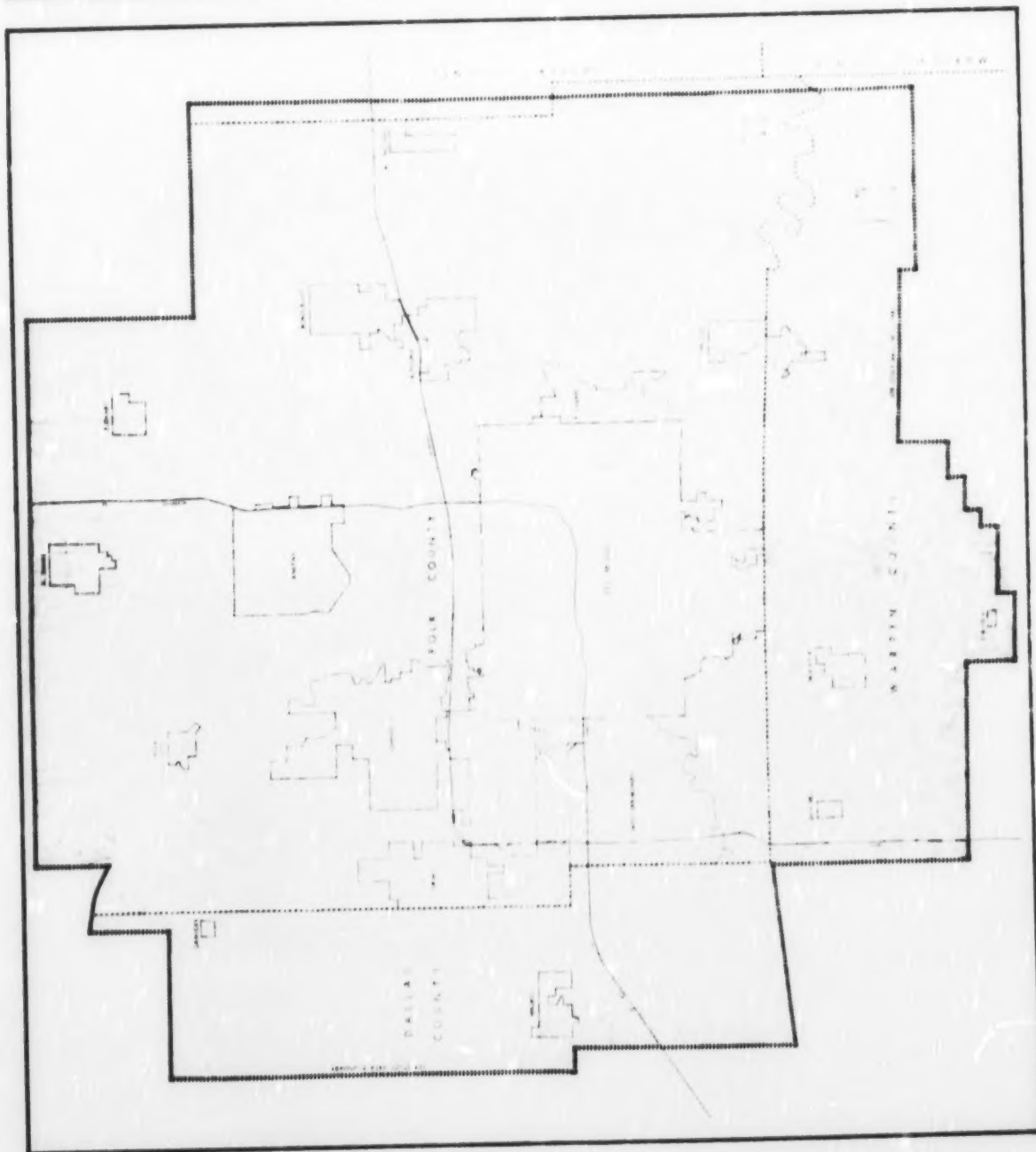


**Central Iowa Regional Association
of Local Governments**

**KIRKHAM
MICHAEL**

KIRKHAM MICHAEL AND ASSOCIATES
HARLAND BATHOLMEW AND ASSOCIATES
AMERICAN CONSULTING SERVICES, INC.
TENECH ENVIRONMENTAL CONSULTANTS
INC. CARLETON D. REH AND COMPANY

PREPARED BY THE WAY AND MEANS THROUGH A GRANT FROM THE
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT, FOR THE
FEDERAL WATER POLLUTION CONTROL ACT (AMENDMENT OF 1972)



Aesthetics

Much of the natural beauty in the study area is related to the meeting of land and water. The floodplains and wooded slopes adjacent to the rivers and streams of the area provide a scenic relief from the rolling plain which dominates central Iowa. Furthermore, it is in the floodplains and surrounding slopes where most of the woody vegetation can be found. Elms, cottonwoods, and willows grow on the valley floors, and oaks and hickories grow on the valley walls and ridges above the stream channels. Many of the parks in the area are located in these meeting places of land and water and, therefore, have the potential for preserving important aesthetic resources. The management of these parks, as well as other lands bordering rivers, lakes and streams, is crucial to the maintenance of these aesthetic resources. Perhaps the most important element of good management in this respect is maintaining a sufficient buffer zone of undisturbed land between the river itself and the cultivated and developed land surrounding it. A river or stream completely stripped of this buffer zone loses much of its natural beauty and also enhances the rates of siltation of the waterway and erosion of the channel.

The bluffs and ridges along the Des Moines River south of the City of Des Moines might be considered an especially scenic area. This area is particularly deserving of consideration in the form of adequate natural areas between the stream channel and stream-side development of any kind. The minimum width of the natural area necessary to protect the scenic value will vary along the channel depending on the width and configuration of the floodplain, the topography of the valley wall, and the character and density of the vegetation along the channel.

Noise

Information on existing and projected noise levels is available primarily in connection with specific highway construction and widening projects.

Noise-generating land uses in the study area include interstate highways and other auto/truck traffic thoroughfares; concentrations of streets as found in downtown Des Moines and selected outlying areas; railroad switching areas; the municipal airport; and plants producing heavy equipment, such as tractors and heavy farm machinery. At the present time, there is not sufficient data at the scale of the study area itself which would allow conclusions affecting areawide planning. Location of any significant noise-generating operations in connection with wastewater treatment will need to be made giving full consideration to impact on residential or other noise sensitive land uses.

Radioactivity

There are 13 individual or organizations who are licensed to use radioactive materials in the study area. All are located in the City of Des Moines. Seven are for medical treatment purposes; six are for use in industry and research. All licensees are required to keep complete records of their acquisition, use and disposal of radioactive materials and present their records for review by regulatory officials on request. The Iowa Department of Environmental Quality is furnished with copies of license, privileges, reports and other relevant documents.

The radioactive sources in the study area are not presently a significant threat to its environmental quality (Haars, 1976).

CHAPTER III - ALTERNATIVES

General Analytical Approach to the Development of Alternatives

Alternative areawide plans were developed in four stages

Stage one consisted of developing and screening sub-systems and options for the control and reduction of continuous point sources of pollution, intermittent point sources and non-point sources. At this stage the broadest possible approach was taken to the solution of identified water quality problems attributable to one or more pollution sources.

Stage two consisted of combining feasible sub-systems and options into sub-plans, i.e., continuous point source sub-plans, intermittent point source sub-plans and non-point source sub-plans.

Stage three consisted of systematically screening all sub-plans with respect to seven weighted criteria. For each criterion, consultants prepared detailed technical comments on each sub-plan and submitted them for consideration by the Coordinating Committee of resident professionals and private citizens, who carried out the actual screening. The Committee also determined the weighting factors applied to each criterion.

Stage Four consisted of combining the screened sub-plans into eight alternative areawide plans for final screening and selection. The same criteria used in sub-plan screening were used here. The screening was again carried out by the Coordinating Committee, aided by detailed technical comments and discussion with the consultants.

Continuous Point Source Alternatives

Feasible Systems, Sub-systems and Options

Community Options - Des Moines

Wastewater Treatment Options

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1. trickling filter plants
2. activated sludge plants
3. other mechanical plants
 - a. oxidation ditches
 - b. rotating biological surfaces
 - c. synthetic media trickling filters
 - d. activated bio-filters
 - e. fine screening and filtration devices
 - f. chemical treatment
4. waste stabilization lagoons
5. private disposal systems

Sludge Treatment and Disposal Options

Treatment Options:

1. thickening by gravity sedimentation followed by dewatering or digestion
2. chemical treatment followed by dewatering
3. anaerobic or aerobic digestion followed by dewatering
4. dewatering by vacuum filtration, pressure filtration, centrifugation or on drying beds and lagoons

Disposal Options:

1. landfill
2. incineration
3. land application
4. production of soil conditioners

Wastewater Reuse and Disposal Options

1. domestic (potable/non-potable)
2. industrial reuse
 - a. cooling water
 - b. boiler feed water
 - c. process makeup water

3. agricultural reuse (irrigation)
4. recreation
 - a. irrigation of parks, golf courses, etc.
 - b. supplemental supply for lakes and reservoirs
5. groundwater recharge

Outlying Communities with Mechanical Treatment Plants (Altoona, Ankeny, Grimes, Highland Hills, Mitchellville, Pleasant Hill, Urbandale)

1. Upgrade existing plant
2. Abandon existing plant and build sewer connections to areawide treatment plant or its collection system

Outlying Communities with Treatment Lagoon or Lagoon System (Bondurant, Carlisle, Des Moines Area "B", Des Moines Area "C", Elkhart, Greenfield Plaza, Granger, Lakewood, Norwalk, Polk City, Waukee)

1. Expand existing lagoon or lagoon system
2. Abandon lagoon(s) and build sewer connection to treatment plant in neighboring community
3. Abandon lagoon(s) and build sewer connection to areawide treatment or its collection system

Industrial Options

Direct Discharging Industries (American Can Co., Firestone Tire and Rubber Co., Hallett Construction Co., Marquette Cement Mfg. Co., Martin-Marietta Corp., Meredith Printing Corp., Peters Construction Co.)

1. continue with existing operation
2. provide closed loop for recycling of cooling water or washing water only - with minimal net discharge to receiving stream

Municipally Treated Industries (Adams Laboratories, Inc., Amend Packing, AMF Lawn and Garden Division, Anderson Erickson Dairy, Armstrong Tire and Rubber Co., Beaver Valley Canning Co., Bookey Packing, Can-Tex Industries, Cargill Inc., Chicago Rock Island and Pacific Railroad, DeTray Plating, Diamond Laboratories, Eagle Iron Works, Emery Plating, F.W. Means, Great Plains Bag Corp., Hiland

Potato Chip., Iowa Fund, Inc., Iowa Power and Light Co., Lambert Ice Cream Co., Massey-Ferguson Des Moines, Meredith Corp., Mid-American Dairy, Mid-Continent Bottlers, National By-Products, Inc., Prairie Farm Dairy (Flynn), Swift Edible Oil Co., Union Oil Mid-Iowa Truck Plaza, United Plating, Wilson and Company, Inc.)

1. continue with present system of discharge to municipal treatment plants and ultimately to areawide plant
2. pre-treat wastewater and discharge to municipal treatment plants (likely candidates include Anderson Erickson Dairy, Cargill, Inc., Wilson and Co. Inc., Hiland Potato Chip, Bookey Packing, Prairie Farm Dairy (Flynn), National By-Products, Inc., Mid-American Dairy)
3. use existing industrial treatment facilities for pre-treatment and discharge to municipal treatment plants
4. upgrade existing treatment facilities
5. abandon all existing industrial treatment facilities and discharge to municipal treatment plants
6. combine wastewater with that of neighboring industry(ies) and discharge to areawide plant via new sewer connection
7. discharge cooling water directly to Des Moines River or other receiving stream and discharge only process wastewater for treatment
8. provide closed loop for recycling of cooling water or washing water - with minimal net discharge to receiving stream

Feasible Sub-plans

Community Options

Des Moines. Three basic options were selected for treatment facilities:

1. Improve and expand existing Des Moines main plant
2. Make minimum necessary improvements in existing Des Moines main plant for interim period, during which new plant would be constructed downstream. Existing plant would be abandoned in stages over a period of approximately 10-15 years.
3. Construct new plant downstream and abandon existing plant as soon as possible.

Each of these basic treatment options was combined with the following sub-alternates for transport and treatment of sewage from Ankeny (west), Johnston, Urbandale, Beaver Creek Sanitary District, Lovington, Saylor Township and Camp Dodge

1. Construct a north areawide treatment plant. The facility would provide secondary treatment but not nitrification. It would discharge to the Des Moines River near the northern City Limit of Des Moines.
2. Pump flows to the East 20th Street interceptor of existing collection system.
3. Pump flows to Four Mile Creek interceptor, which would be constructed to a point at 2nd Avenue.
4. Transport flows by gravity south along Des Moines River in a new interceptor which would be constructed to a point at 2nd Avenue.

Alleman

1. Abandon septic tanks. Build collection system and construct lagoon.
2. Maintain septic tanks. Intercept drainage from existing discharge pipe. Construct interceptor and lagoon.

Carlisle

1. Upgrade existing lagoon.
2. Abandon lagoon and discharge to areawide plant

Cumming

1. Abandon septic tanks. Build collection system and lagoon.

Elkhart

1. Upgrade existing lagoon.

Granger

1. Upgrade existing lagoon.

Grimes

1. Upgrade existing treatment plant.

Hartford

1. Abandon septic tanks, build collection system and construct lagoon.

Mitchellville

1. Abandon existing plant, construct trunk to new lagoon downstream on Camp Creek.

Norwalk

1. Upgrade existing lagoon.
2. Upgrade existing lagoon. Build an outfall sewer for the northern part of Norwalk and discharge to the Lakewood lagoon.

Polk City

1. Upgrade existing lagoon.

Spring Hill

1. Abandon septic tanks. Build collection system and lagoon.

Waukee

1. Upgrade existing lagoon.

Industrial Options

Direct Discharging Industries (American Can Co., Firestone Tire and Rubber Co., Hallett Construction Co., Marquette Cement Mfg. Co., Martin-Marietta Corp., Meredith Printing Corp., Peters Construction Co.)

1. continue with existing operation
2. provide closed loop for recycling of cooling water or washing water only - with minimal net discharge to receiving stream

Municipally Treated Industries

Anderson Erickson Dairy, Cargill, Inc., Wilson and Co. Inc., Hiland Potato Chip, Bookey Packing, Prairie Farm Dairy (Flynn), National By-Products and Mid American Dairy:

pre-treat as required by respective wastewater characteristics and discharge to areawide plant

Adams Laboratories, Inc.

1. continue with existing facilities to meet effluent limitations
2. discharge via new gravity sewer in Walnut Creek to Des Moines main plant and ultimately to areawide plant
3. pump to Waukee for treatment
4. use existing treatment facilities for pre-treatment and discharge to Des Moines or Waukee for treatment

Armstrong Tire and Rubber Company

1. continue with existing discharges
2. run a common pipe directly to Des Moines River for discharge of cooling water (could be combined with that of Chicago Rock Island and Pacific Railroad)
3. provide closed loop for recycling cooling water - with minimal net discharge to Des Moines River.

Beaver Valley Canning Company

1. continue with existing treatment and discharge
2. discontinue discharge of cooling water to Grimes treatment plant and discharge directly to stream
3. use lagoons for pre-treatment and discharge to areawide treatment plant

Can-Tex Industries

1. continue with existing treatment system
2. discharge to areawide treatment plant

Chicago Rock Island and Pacific Railroad

1. continue with existing treatment process
2. discharge skimmed effluent to Des Moines River

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3. discharge skimmed effluent to areawide treatment plant
4. provide closed loop for recycling of washing water - with minimal net discharge to Dean Lake

Crossroads U.S.A., Incorporated

1. continue with existing treatment system
2. discharge to areawide treatment plant

Iowa Fund, Incorporated

1. upgrade existing lagoon to meet controlled discharge standards
2. develop joint treatment system with Mid-Continent Bottlers
3. discharge to areawide treatment plant
4. use existing lagoon as for pre-treatment and discharge to joint treatment system or areawide system

Iowa Power and Light Company

1. continue with present operation
2. continue with present disposal of fly ash slurry and seal water but abandon septic tank and discharge to areawide treatment plant
3. provide closed loop for recycling cooling water with minimum discharge to Des Moines River

Mid-Continent Bottlers

1. upgrade existing lagoon to meet controlled discharge standards
2. develop joint treatment system with Iowa Fund, Incorporated
3. discharge to areawide treatment system
4. use existing lagoon for pre-treatment and discharge to joint treatment system or areawide system

Union Oil Mid-Iowa Truck Plaza

1. continue with present operation and chlorinate effluent
2. abandon existing treatment facility and discharge to areawide system
3. utilize existing polishing pond for pre-treatment and discharge to areawide system

Preferred Sub-plans

Based on extensive and systematic screening procedures, the Coordinating Committee selected two continuous point-source sub-plans for further development and combination into areawide alternate plans.

Sub-plan I:

Expand and upgrade existing Des Moines main plant to make it suitable as an areawide treatment plant serving all urbanized areas except 12 outlying communities. Transport flows from the seven north area communities along Des Moines via new gravity sewer constructed to a point at 2nd Avenue. The options for outlying communities and industries were not refined or modified beyond the stage described under "Feasible Sub-plans" above.

Sub-plan II:

Construct a new areawide treatment plant in the general vicinity of the existing Des Moines main plant. (The same as sub-plan I in all other respects.)

Intermittent Point Source Alternatives

Feasible Systems, Sub-systems and Options

Combined Sewer Discharges

1. Continue present operation and maintenance programs for the combined sewer system.

2. Remove storm sewer inlets from combined sewer system (partial separation).
3. Construct relief sewers in those areas where the downstream capacity of the existing combined sewer system is inadequate to carry combined flows. The relief sewer would discharge either to a treatment facility or to an existing sewer system which has the capacity for additional flows.
4. Construct off-line storage for excess flows. The stored flow would either be pumped back to the system during low-flow periods or treated directly in the storage facility and discharged to a suitable receiving stream.
5. Construct direct treatment facilities for combined sewer overflows. These facilities would be either at individual overflow points or at a centralized treatment facility. Treatment could be provided by:
 - a. conventional treatment (physical, biological, disinfection)
 - b. high-rate micro-screening followed by disinfection
 - c. disinfection only
 - d. mechanical flow separation (e.g. flow-activated centrifugal flow separators)
6. Develop source control measures, such as street cleaning, erosion control, etc.
7. Develop resource conservation measures, such as use of treated combined and storm sewer effluents in one or more domestic, industrial, agricultural, recreational or groundwater recharge applications.
8. Other:
 - a. increase existing maintenance program
 - b. improve hydraulic characteristics
 - c. increase storage and treatment during storm flow conditions to the greatest possible extent.

Storm Sewer Discharges

1. Continue present operation and maintenance program for the storm sewer system.

2. Provide storage facilities (either surface or sub-surface). Flows would be held in storage for subsequent slow release to stream or storm sewer or held for possible reuse.
3. Direct treatment of storm sewer discharge
 - a. conventional treatment, including physical and biological methods followed by disinfection
 - b. high-rate micro-screening followed by disinfection
 - c. disinfection alone
 - d. mechanical flow separation (e.g. flow-activated centrifugal flow separators)
4. Source control options such as street cleaning, erosion control, etc.
5. Resource conservation measures, such as use of treated effluents in one of more domestic, industrial, agricultural, recreational or groundwater recharge applications.

Feasible Sub-plans

Combined Sewer Discharges

1. Continue with present operation and maintenance program with emphasis on implementing source control options.
2. Construct flow separators at overflow points.
3. Remove storm sewer inlets from combined system and divert storm discharges to new or existing storm sewer (partial separation).
4. Provide for storage detention and subsequently discharge to treatment facility or provide treatment in detention facility itself.
5. Segregate sewer systems and provide separate sewer lines to transport flows to treatment facility(ies).
6. Maximize storage capacity in existing and new transport and treatment facilities.

Storm Sewer Discharges

1. Continue with present operation and maintenance program with emphasis on implementing source control options.

2. Construct flow separators at overflow points.

Preferred Sub-plans

1. Segregate sewer systems and provide separate sewer lines to transport flows to treatment facility. The facilities required for implementing this sub-plan are included in the transportation segment of both preferred point source sub-plans. Only minimal modifications would be required to accommodate needs of intermittent point source control strategy.
2. Construct flow separators at combined and storm sewer overflow points.

Non-point Source Alternatives

Feasible Systems, Sub-systems and Options

Existing Landfills and Dumps

1. groundwater diversion using tile drains
2. groundwater diversion by slurry trenching
3. pond treatment of leachates

Cropland Runoff

1. no-till planting
2. conservation tillage practices
3. contouring
4. conversion of erodible lands to pasture
5. reduction of fall plowing
6. use of turf cover in natural swales and waterways
7. terracing
8. site-specific erosion control structures

Animal Feeding Operations

1. diversion berms

2. fences and/or supplemental plantings along waterways

Construction Sites

1. scarification
2. tracking
3. interception and diversion structures
4. vegetative stabilization
5. use of mulches on excavated surfaces
7. rip-rapping
8. use of gabion dams
9. construction of sediment basins
10. use of gravel inlet filters

Urban Storm Runoff Control

1. increase frequency of street sweeping
2. use of grass linings in drainage channels
3. pave unpaved roads
4. chemically treat unpaved roads
5. speed control on unpaved roads
6. regular cleaning of catch basins after storms

Feasible Sub-plans

1. continue with existing practices for all categories of non-point source pollution.
2. promote cropland runoff control options and continue with existing practices for all other categories
3. sub-plan 2 plus increase frequency of street sweeping
4. sub-plan 3 plus enforcement of ordinances controlling construction site practices

5. sub-plan 4 plus a special control on the development of agricultural land for urban uses
6. all provisions of sub-plan 5 except the promotion of additional cropland runoff options (see sub-plan 2) beyond present trends and programs

Preferred Sub-plans

1. Promotion of cropland runoff control options via financial support for permanent soil and water conservation control measures such as:
 - a. conservation tillage practices
 - b. no-till planting
 - c. conversion of erodible lands to pasture
 - d. terracing
 - e. site-specific erosion control structures
 - f. contouring

Options of secondary importance are reduction in fall plowing and use of grassed (turf) waterways.

2. Sub-plan 1 described above, enforcement of construction site control ordinances, and explicit controls designed to limit the conversion of agricultural to urban uses

Areawide Plans

The six technical subplans which have been classified as feasible subplans have been combined into eight alternative areawide plans. The six technical subplans have been described in detail in previous sections of this report. The facilities plans for the outlying communities will be the same, regardless of which alternative areawide plan is selected as the final plan. For the following outlying communities, existing lagoon systems would be expanded to provide for controlled discharge:

- (1) Carlisle
- (2) Elkhart
- (3) Granger
- (4) Norwalk
- (5) Polk City

The following communities would construct collection systems and controlled discharge lagoons:

- (1) Alleman
- (2) Cumming
- (3) Hartford
- (4) Spring Hill

Waukee would upgrade its existing aerated lagoon system by adding additional storage and installation of a rock filter for effluent polishing.

Mitchellville would abandon its existing mechanical plant and construct aerated controlled discharge lagoon facilities. Grimes would remain as a continuous discharger and upgrade its existing mechanical plant and lagoon system. A 201 Facility Plan for Runnells has been completed and is on file. The plan recommends the construction of a collection system and a mechanical treatment facility. Descriptions of the eight alternative areawide plans are presented in the following sections. Table III-1 summarizes the costs of the eight alternative areawide plans.

Alternative Areawide Plan I: Expansion of the Existing Des Moines WWTP, Segregation of Combined Sewers, Promotion of Cropland Runoff Control Options, and Possible Increases in Street Sweeping

The plan calls for an expansion of the existing Des Moines WWTP service area. Flows from Camp Dodge, Lovington, Urbandale - Beaver Creek, Johnston, Saylor Township and West Ankeny would be transported along the west bank of the Des Moines River. Flows from East Ankeny, Altoona, Bondurant, Delaware Township, and Pleasant Hill would be conveyed by gravity along Four Mile Creek. Flows from West Bloomfield, Lakewood, Highland Hills, Greenfield, Areas B and C, and Bloomfield would be transported to the Des Moines WWTP by two lift stations, force mains, and

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Table III-1

COMPARISON OF AREAWIDE PLANS ANNUAL COSTS (\$ MILLIONS)

Des Moines, Iowa 208 Area

Areawide Plan	Point Sources	Capital		Operation and Maintenance			Total
		Non-Point Sources	Intermittent Sources	Point Sources	Non-Point Sources Street Sweep	Intermittent Sources	
I	\$.858(1) 1.783(2) .231(3)	\$2.50	\$ 0*	\$4.830(4) .329(5)	\$1.34	\$ 0	\$11.871
II	.858 1.783 .231	2.75	0	4.830 .329	1.34	0	12.121
III	.858 1.783 .231	2.50	.329	4.830 .329	1.34	.056	12.256
IV	.858 1.783 .231	2.75	.329	4.830 .329	1.34	.056	12.506
V	.858 1.943 .231	2.50	0	4.519 .329	1.34	0	11.720
VI	.858 1.943 .231	2.75	0	4.519 .329	1.34	0	11.970
VII	.858 1.943 .231	2.50	.329	4.519 .329	1.34	.056	12.105
VIII	.858 1.943 .231	2.75	.329	4.519 .329	1.34	.056	12.355

*Due to the fact that the construction necessary for the segregation of combined and separated sewer system is an integral part of the point source subplans and, therefore, included in their total cost, no cost for segregation has been shown under intermittent source costs.

- (1) Annual Capital Cost of Sewer Collection Systems for Johnston, Lovington, Delaware Township, Saylor Township and Bloomfield Service Areas
- (2) Annual Capital Cost for Interceptors, Equalization & Treatment Plant for the Integrated Community Area
- (3) Annual Capital Cost for Interceptors and Treatment for Outlying Community Area
- (4) Annual Operation and Maintenance Cost for Integrated Community Area
- (5) Annual Operation and Maintenance Cost for Outlying Communities

gravity sewers. The existing Des Moines WWTP would be expanded to serve an estimated year 2000 population of 362,000 and a peak hydraulic flow of 165 MGD.

The sanitary flow from the northwest Des Moines area, Camp Dodge, Lovington, Urbandale - Beaver Creek, Johnston, Saylor Township and West Ankeny would be segregated by routing the flow through a new interceptor sewer which is to be constructed parallel to the Westside Interceptor. The Westside Interceptor presently receives flow from combined sewers. Flow from the combined system would enter the main outfall to the plant up to a point where the dilution ratio of the combined flow system is 5 to 1. Flows in excess of 5 to 1 would be diverted to the combined sewer discharges.

Non-point source control within this plan is provided by a subsidy program for cost sharing on cropland runoff controls and possible increases in street sweeping for Des Moines residential areas and residential arterials. The cost-sharing subsidy program would result in the construction of all needed terraces and grade stabilization structures by the year 2000. The proposed increase in street sweeping would result in fairly uniform residential cleaning within the metropolitan area.

Alternative Areawide Plan II: Expansion of the Existing Des Moines WWTP, Segregation of Combined Sewers, Promotion of Cropland Runoff Control Options, Possible Increases in Street Sweeping, Construction Site Control Option Enforcement through Ordinances, and Controls to Limit the Urban Development of Agricultural Land

This plan is similar in all respects to Plan I except that in addition to cropland runoff options and increased street sweeping for non-point source control there would also be passage and enforcement of ordinances to control erosion and sedimentation from construction sites and controls to limit the rate and extent of urban development of agricultural land. The latter could be carried out through county zoning actions.

Alternative Areawide Plan III: Expansion of the Existing Des Moines WWTP, Segregation of Combined Sewers, Flow Separators for Combined Sewer Overflows and Strategic Storm Sewer Discharges, Promotion of Cropland Runoff Control Options, and Possible Increases in Street Sweeping

This plan is similar in all respects to Plan I except that in addition to segregation of combined sewers for intermittent point source controls, flow separators would be constructed at each of the combined sewer overflows and at strategic storm sewer discharge points for the removal of significant fractions of grit, settleable solids, and floatable solids in the respective flows. In this way, the combined sewer overflows and storm sewer discharges would receive a degree of physical treatment before being discharged to the receiving streams.

Alternative Areawide Plan IV: Expansion of the Existing Des Moines WWTP, Segregation of Combined Sewers, Flow Separators for Combined Sewer Overflows and Strategic Storm Sewer Discharges, Promotion of Cropland Runoff Control Options, Possible Increases in Street Sweeping, Passage and Enforcement of Ordinances for the Control of Erosion and Sedimentation from Construction Sites, and Controls to Limit the Urban Development of Agricultural Land

This Plan is similar to Plan I except that flow separators would be constructed at each of the combined sewer overflows and at strategic storm sewer discharge points for additional intermittent point source control, and that ordinances would be passed and enforced to control erosion and sedimentation from construction sites and controls made to limit the rate and extent of urban development of agricultural land. The latter could be carried out through county zoning actions.

Alternative Areawide Plan V: Construction of a New Des Moines WWTP, Segregation of Combined Sewers, Promotion of Cropland Runoff Control Options, and Possible Increases in Street Sweeping

This plan calls for an expansion of the existing Des Moines WWTP service area. Flows from Camp Dodge, Lovington, Urbandale - Beaver Creek, Johnston, Saylor Township and West Ankeny would be transported along the west bank of the Des Moines River. Flows from East Ankeny, Altoona, Bondurant, Delaware Township, and Pleasant Hill would be conveyed by gravity along Four Mile Creek. Flows from West Bloomfield, Lakewood, Highland Hills, Greenfield, Areas B and C, and Bloomfield would be transported to the Des Moines WWTP by two lift stations, force mains, and gravity sewers. The existing Des Moines WWTP would be abandoned and a new treatment facility would be constructed immediately east of the present site. The year 2000 service population would be 362,000 and the peak hydraulic flow through capacity would be 165 MGD.

The sanitary flow from the northwest Des Moines area, Camp Dodge, Lovington, Urbandale - Beaver Creek, Johnston, Saylor Township and West Ankeny would be segregated by routing the flow through a new interceptor sewer which is to be constructed parallel to the Westside Interceptor. The Westside Interceptor presently receives flow from combined sewers. Flow from the combined system would enter the main outfall to the plant up to a point where the dilution ratio of the combined flow system is 5 to 1. Flows in excess of 5 to 1 would be diverted to the combined sewer discharges.

Non-point source control within this plan is provided by a subsidy program for cost sharing on cropland runoff controls and possible increases in street sweeping for Des Moines residential areas and residential arterials. The cost-sharing subsidy program would result in the construction of all needed terraces and grade stabilization structures by the year 2000. The proposed increase in street sweeping would result in fairly uniform residential cleaning within the metropolitan area.

Alternative Areawide Plan VI: Construction of a New Des Moines WWTP, Segregation of Combined Sewers, Promotion of Cropland Runoff Control Options, Possible Increases in Street Sweeping, Passage and Enforcement of Ordinances to Control Erosion and Sedimentation from Construction Sites, and Controls to Limit the Urban Development of Agricultural Land

This plan is similar in all respects to Plan V except that in addition to cropland runoff control and increased street sweeping options for non-point source control there would also be passage and enforcement of ordinances to control erosion and sedimentation from construction sites and controls to limit the rate and extent of urban development of agricultural land. This could be carried out through county zoning actions.

Alternative Areawide Plan VII: Construction of a New Des Moines WWTP, Segregation of Combined Sewers, Flow Separators for Combined Sewer Overflows and Strategic Storm Sewer Discharges, Promotion of Cropland Runoff Control Options, and Possible Increases in Street Sweeping

This plan is similar in all respects to Plan V except that in addition to segregation of combined sewers for intermittent point source controls, flow separators would be constructed at each of the combined sewer overflows and at strategic storm sewer discharge points for the removal of significant fractions of the grit, settleable solids and floatable solids in the respective flows. In this way, the combined sewer overflows and storm sewer discharges would receive a degree of physical treatment before being discharged to the receiving stream.

Alternative Areawide Plan VIII: Construction of a New Des Moines WWTP, Segregation of Combined Sewers, Flow Separators for Combined Sewer Overflows and Strategic Storm Sewer Discharges, Promotion of Cropland Runoff Control Options, Possible Increases in Street Sweeping, Passage and Enforcement of Ordinances to Control Erosion and Sedimentation from Construction Sites, and Controls to Limit the Urban Development of Agricultural Land

This plan is similar to Plan V except that flow separators would be constructed at each of the combined sewer overflows and at strategic storm sewer discharge points for additional intermittent point source control; and that ordinances would be passed and enforced to control erosion and sedimentation from construction sites and controls instituted to limit the rate and extent of urban development of agricultural land. The latter could be carried out through county zoning actions.

Selection of Preferred Technical Areawide Plan

The eight technical alternative areawide plans were systematically screened by the Coordinating Committee with the benefit of detailed comments from the consultants in the following seven areas: (1) detailed costs; (2) environmental effects; (3) goal attainment; (4) operability, reliability and flexibility; (5) public acceptability; (6) implementation feasibility; and (7) waste load characteristics.

Prior to the actual selection of the preferred plan, the Committee removed the option of increasing street sweeping from all eight alternative plans because they judged its costs not justifiable in light of the probable benefits.

After group discussion of technical comments in each of the seven areas listed, each member of the Coordinating Committee assigned a score of 1 through 10 to each of the areawide alternative plans for each criterion (1 indicates worst alternative; 10 indicates best). The average value of the assigned scores in each area of evaluation was multiplied by the weighting factor selected earlier by the Committee, and the final sum of products for all areas was used as an indicator (though not the final decision) of preference.

Committee balloting, discussion and final action led to the selection of Alternative VIII.

Alternate Management Plans

As soon as the work on the 208 Program reached the point where it was possible to obtain a concept of the basic problems in regard to the point, non-point and intermittent point systems, the Management Committee initiated its work to develop a management plan capable of carrying out the 208 program as it was evolving. The Management Committee's work was initiated with a very broad approach.

Requirements for a management plan may be obtained from examination of the Public Law 92-500, the Federal Regulations concerning it, and the Federal Guidelines for Development of Management Plans under the 208 Program. A study of this material indicated that for the most part the individual cities and counties within the 208 area had adequate power individually to carry out a 208 wastewater management program. However, no areawide wastewater management program developed. In order that resources could be assembled on an area-wide basis to be applied to the solution to areawide wastewater problems as required by the 208 program, it was evident to the committee that it would be necessary to form a new areawide organization to meet 208 requirements.

It was at this point that the committee began its consideration of the various options for creating a new areawide organization.

The point source discharge problem can be divided into two parts. Initially there was a central system serving Des Moines and the immediately adjacent areas including those which could be reached by trunk sewers and connected to the central system in the future. Beyond the ICA in the remaining parts of the 208 area, there are mostly agricultural uses and 13 communities referred to as "outlying communities". Studies indicate that it would not be economically feasible to bring the outlying communities into the central system.

Intermittent point-source pollution problems consist primarily of the combined sewers within the City of Des Moines. However, this is not entirely a City of Des Moines problem since communities north of the City of Des Moines will become involved in this problem as plans are considered to transport their sewage along the river to a common treatment plant.

EPA standards indicate the 208 programs must deal with both urban and rural stormwater runoff problems. Many of these appeared to require some type of areawide coordinated approach if they were to be solved.

In analyzing the basic problems presented and the need for some type of an areawide approach to their solution, the committee came to the conclusion that there were three basic approaches.

1. Develop an inter-agency agreement (probably under Chapters 28E and F) and an areawide wastewater agency (AWA) and charge it with effecting the necessary coordination of action on the part of the 23 cities and three counties, with doing the continuous 208 planning that is required, and establishing priorities and undertaking general activities of this nature. Point source problems could be solved by an extension of the systems developed in the past, i.e., by inter-agency contracts with the City of Des Moines, and the point-source system developed under this type of an arrangement.
2. Under existing or under new legislation a new areawide agency could be established which in addition to the planning, coordination and priority setting described under Option 1 above, could itself undertake the provision of wastewater treatment and possibly transportation of major wastewater quantities, i.e., trunk sewers, into the central treatment plant. Thus, there would be a planning and coordinating agency as well as an operating agency. Such an

agency could contract with the outlying communities or with other cities and counties with the outlying communities or with other cities and counties for providing such additional services as all wastewater collection and treatment, storm drainage and such other activities that are a part of the 208 program as might be appropriate from time to time.

3. The third concept would be to create a new AWA by new legislation which would in effect create a new agency for the 208 area. This could give the AWA in addition to the planning, coordination and priority setting activities, the collection and treatment activities within the ICA and full responsibility for all water quality problems in the 208 area. Such an agency could be governed by a Board that would be elected by the voters, could be appointed by the Governor, or could be selected by the 26 cities and counties.

Options

Under the three concepts there were a number of categories of options that the management committee examined including the following:

Geographic Jurisdiction. The 208 area could be left alone, it could be modified slightly to adjust its boundaries more closely to the watersheds, or it could be reduced in area significantly, possibly down to the ICA area with the remaining area in effect turned back to the Iowa DEQ.

Participation and Control as previously mentioned could be by the cities and counties through some type of proportionate representation, could be directly by the voters or by a Board appointed by the Governor.

Functions of such an agency could include the planning, priority setting and coordination activities, particularly in regard to regulatory measures utilized for control of non-point sources of pollution wastewater treatment,

sanitary trunk sewer system, and then a number of other possible activities including storm sewer trunks and laterals, monitoring of water quality, sanitary sewer laterals, and even water supply.

Financing involves consideration of a number of options. User charges to the cities and counties were considered as were user charges to the individual users, assessments to benefited property, ad valorem taxes, issuing of revenue bonds and general obligation bonds, and issuing of short-term debt instruments.

Ownership of the facilities became an important consideration. Under various options this could be the areawide agency, by the cities and counties individually, or by the cities and counties with undivided interests.

Planning, Coordination and Monitoring could be done by the areawide agency or partly by the areawide agency, partly by the cities and counties, and partly by the Iowa DEQ.

Operation and Maintenance of facilities could be partly by the areawide agency, partly by the cities and counties, all by cities and counties, or all by the areawide agency.

There are a possible 77,760 management plans that may be considered by combinations of these concepts and options. The committee began its study by deciding to reduce this number by first discussing the various concepts, their advantages and disadvantages, and then relating these to the various options for organization, activities, and responsibility. These discussions resulted in the elimination of certain concepts as well as certain options. When the committee had agreed upon the most desirable options regarding the activities and functions of an AWA, it then went back and reconsidered the various concepts that might be used for an organization to handle what appeared to be the needed type of areawide activities. This

brought about a reduction of management plans to two basic families of alternatives with four possible options under each one. These are described in detail in the memorandum developed by the staff for the January 5, 1977 technical and management committee meetings. However, the basic features of the alternates are as follows.

Alternate I Family

The Alternate I family of management plans make as small an adjustment as possible to the existing situation as required to comply with 208 requirements. Fundamentally, this alternate is based upon an areawide agency that would be charged with planning, monitoring, programming, and priority setting only. All other wastewater programs would be undertaken and financed by the individual units of local government.

Alternate IA. Alternate IA would be a new AWA organization created under section 28E and 28F of the Iowa Statutes by a new agreement effected between the 26 cities and the three counties in the 208 area.

Alternate IB. Alternate IB would call for the City of Des Moines to undertake the coordination, planning, priority-setting activities assisted by an advisory committee composed of representatives of the other units of government.

Alternate IC. Alternate IC would be quite similar to Alternate IB except that the activity would be undertaken by the Des Moines Water Board.

Alternate ID. Alternate ID would be similar to Alternate IA but would consist of a modification of the existing inter-governmental agreement which established the Des Moines sewer planning policy and technical committees. This would be amended to provide for the necessary continued planning coordination and priority setting as required under the 208 program.

Alternate II Family

The Alternate II family would give the AWA certain construction and operation functions in addition to the planning, coordination and priority-setting. Under this family of alternatives, there would be some form of transfer of ownership of existing facilities from local governmental jurisdictions to the new agency.

Alternate IIA. Under Alternate IIA the AWA would undertake the construction, financing, operation and maintenance of the trunk sanitary sewers and the treatment facilities in the ICA. Similar services could be provided to outlying communities under voluntary agreements. A sample plan was developed to indicate the approximate level of detail that should be provided in the management plan that is incorporated into the 208 plan.

Alternate IIB. Alternate IIB would be quite similar to Alternate IIA except that the Board that governs the AWA would be elected directly by the people.

Alternate IIC. Under Alternate IIC, the City of Des Moines would be designated as the areawide waste treatment management agency. A utility board would be established as the organizational vehicle. The utilities board would be established by amending Section 388 of the Iowa Code. Establishment of such a board would also require approval by the voters at a city election. The board could then proceed to carry out the same basic functions as those provided under Alternate Plans IIA and IIB.

Alternate IID. Alternate IID would organize the AWA as a metropolitan sewer district under the requirements of Chapter 358 of the Iowa Code. This requires a petition of 25 percent of the voters in each of the three counties as well as a favorable referendum of the voters of the entire area. Once established the sewer district would take over the ownership and management

of all of the wastewater collection and treatment facilities within the 208 area, ICA and outlying communities.

Obviously there can be many variations and many changes in the details of the various management alternative and these details may determine the effectiveness of the management plan.

CHAPTER IV - DESCRIPTION OF PROPOSED PLAN

General Description

The proposed areawide plan includes the construction of one new areawide WWTP, segregation of combined sewers, flow separators for combined sewer overflows and strategic storm sewer discharges, promotion of cropland runoff control options, passage and enforcement of ordinances for the control of erosion and sediment from construction sites, and reduction in the urban development of unincorporated areas.

The plan calls for an expansion of the existing Des Moines WWTP service area. Flows from Camp Dodge, Lovington, Urbandale - Beaver Creek, Johnston, Saylor Township and West Ankeny would be transported along the west bank of the Des Moines River. Flows from East Ankeny, Altoona, Bondurant, Delaware Township, and Pleasant Hill would be conveyed by gravity along Four Mile Creek. Flows from West Bloomfield, Lakewood, Highland Hills, Greenfield, Areas B and C, and Bloomfield would be transported to the areawide WWTP by two lift stations, force mains, and gravity sewers. The existing Des Moines WWTP would be abandoned and the new areawide treatment facility would be constructed immediately east of the present site. The year 2000 service population is estimated to be approximately 360,000 and the peak hydraulic flow through capacity would be 165 MGD.

The sanitary flow from the northwest Des Moines area, Camp Dodge, Lovington, Urbandale - Beaver Creek, Johnston, Saylor Township and West Ankeny would be segregated by routing the flow through a new interceptor sewer which is to be constructed parallel to the Westside Interceptor. The Westside Interceptor presently receives flow from combined sewers. Flow

from the combined system would enter the main outfall to the plant up to a point where the dilution ratio of the combined flow system is 5 to 1. Flows in excess of 5 to 1 would be diverted to the combined sewer overflows. Flow separators would be constructed at 11 combined sewer overflows and at three storm sewer discharges for the removal of significant fractions of the grit, settleable solids, and floatable solids from the discharges. In this way, these selected combined sewer overflows and storm sewer discharges would receive some physical treatment before entering the receiving streams.

Non-point source controls contained within this plan would be achieved through increasing the subsidy program for cost sharing on cropland runoff controls, through the passage and enforcement of ordinances for the control of erosion and sediment from construction sites, and through a reduction in the rate of urban development of unincorporated areas. A cropland runoff control subsidy program would provide cost sharing in addition to that provided under existing programs in order to enable the construction of all needed terraces and grade stabilization structures by the year 2000. Construction site erosion and sediment control ordinances, if properly enforced, would reduce the non-point source sediment loads to streams. Reductions in the development of unincorporated areas would reduce potential problems associated with septic tanks or long distance sewer extensions, solid waste disposal, etc.

Description of Areawide Sub-systems

Interceptors

Plate V-1 shows the proposed interceptor network in relationship to the intensity development pattern for the year 2000 and the sites for the equalization basins and lift stations proposed on the interceptor network. The equalization basins vary in size from 0.22 to 7.72 million gallons and serve to equalize extraneous flows from infiltration/inflow sources. Thus, use of the

existing interceptor sewers would be optimized. The capacity of each reach of interceptor is shown on the attached plate together with the size of interceptor proposed. A detailed description showing the plan and profile sheets and the exact site proposed for the equalization basins are included in the Appendix of the Phase III report.

Treatment Plant

The proposed wastewater treatment plant would have an average design flow capacity of 50.83 MGD with a peak flow capacity of 165 MGD. The proposed plant incorporates grease recovery and grit recovery facilities followed by conventional primary clarification tanks. Following primary sedimentation, the flow would be pumped across a synthetic trickling filter media tower and for BOD reduction and then through an aeration tank for the purpose of further BOD reduction and partial nitrification. Following the tower and the aeration facilities, final sedimentation tanks would be provided together with post-chlorination.

A recirculation system is incorporated into the biological stage of the treatment process. The sludge generated from the plant would be anaerobically digested and the digested sludge conveyed by truck to agricultural land. As a back-up system, landfilling the sludge can be accomplished also.

The proposed design, construction and plant start-up would occur over a five-year period and be staged in such a manner that portions of the plant could be utilized as soon as constructed. The carrying capacity of the present interceptor system exceeds the design capacity of the proposed plant; however, segregating combined sewers will substantially reduce flows to the treatment plant. By providing a process which can be split treated, the plant can be operated to obtain the degree of treatment necessary.

The effluent standards would be as follows: The plant would be designed for the anticipated flows for the year 2000. Present dry weather flows are estimated to be approximately 80 percent of that total. All of the peak capacity would be utilized once the proposed interceptor sewers are made available.

During normal operations in dry weather, the plant could nitrify the total flow if necessary. Increased plant efficiency from the standpoint of effluent quality could be realized by the addition of coagulating chemicals for additional suspended solids removal in both the primary clarification phase and in the final clarification phase.

The plant would be controlled by a mini computer in order to optimize power costs and treatment efficiency. By the time the new plant is constructed, approximately four million gallons per day of industrial waste would be treated. The strength of the industrial waste is expected to decrease as time continues. The population served initially by the plant is estimated to be 250,000 and the ultimate population served is estimated to be approximately 360,000. A sketch of the process proposed is included, together with the proposed plant layout.

Sludge Disposal

The grit recovered from the system would be washed and hauled to the landfill. The grease collected would also be disposed by landfill. Primary sludge from the primary clarification tanks would be pumped directly to anaerobic digesters which are enclosed tanks. The biological sludge generated from the process would be thickened first by gravity thickeners (with or without chemical). The thickened biological sludge would then be combined with the primary sludge in the anaerobic digesters for a period of several days. Following digestion, the sludge would be dewatered utilizing chemical conditioning and vacuum filters. The dewatered sludge would then be trucked and spread on agricultural land in accordance with acceptable

standards and in accordance with the rates determined for the crop and conditions of the land. As an alternate the digester sludge could be hauled in tank trucks and spread in liquid form on agricultural land by the use of "big-wheel" type hauling equipment. As a backup system the dewatered sludge could be hauled to landfill for ultimate disposal.

Other sludge disposal options considered were incineration and production of soil conditioners. The limiting factors affecting incineration are the rising cost of fuels necessary for effective incineration, the questionable use of increasingly scarce fuels for sludge disposal and the negative air quality impact and/or high cost of emission controls to minimize air pollution.

The production of soil conditioners generally requires some form of composting of sludge with organic matter such as wood chips, sawdust, leaves or organic garbage. The recommended plan for sludge disposal does not include this option because information on production costs and marketing of the product were not available. However, the selected plan would not preclude future development of the option should the economic indicators be favorable.

Sludge is not a problem in outlying communities where wastewater is treated in lagoons.

Management Plan

The management plan would be developed in two stages: an Interim Plan, and a Final Plan described in more detail as follows:

Interim Management Plan

The interim management plan would take effect April 25, 1977, the date of the expiration of the present 208 planning program.

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There would be a new "Areawide Wastewater Agency" created by amending the "Sewer Planning Agreement" entered into in 1973 between the Central Iowa Regional Association of Local Governments (CIRALG) and the 26 units of local governments in the 208 area. The new AWA would be governed and operations under it conducted by basically the same arrangement of committees used in the preparation of the 208 plan, i.e. -

Policy Committee

Technical Committee

with provisions for others, including Coordinating, Citizens and Financial Committees.

No change would be made in the method of selecting committees, in the committees' responsibilities or in the method of financing the operation.

The interim management plan would have a life of approximately two years, being discontinued upon the creation of the ultimate management system as described subsequently.

The interim AWA would have the responsibility for and it would be its duty to carry out the following activities.

Program of the Interim Agency

1. Annual Update of 208 plan would be a major responsibility. For the first year this should include data from the extensive sewer system evaluation surveys and additional water quality monitoring particularly of the impact of the combined sewers (as a precedent to reconsidering priorities for the flow separator program). The Land Use Intensity Plan should be reviewed and brought up-to-date.

2. Setting of Annual Priorities for Construction. Initial schedules of improvements have been made for a five-year and a 20-year period. These would be updated annually based on construction completed and new improvements required.

3. Water Quality Monitoring on an areawide basis should be programmed in coordination with the local and DEQ monitoring programs. Additional monitoring needed would have to be financed.

4. Assistance in Preparation of Grant Applications by the local governmental units would be provided by AWA. Standard "back up" data and material for such applications would be developed.

5. Coordination with Iowa DEQ would include:

- A. Measurement of the relation between the water quality monitoring and the water quality standards.
- B. Review of water quality monitoring to establish compliance with effluent standards. Recommended actions by local governments in relation to violations of these standards.
- C. Assistance to local governments in complying with NPDES permits.
- D. Any review of sewer construction permits as requested by DEQ to determine conformity with the 208 plan.

6. General Coordination for Control of Non-Point Pollution Sources would provide for the AWA to undertake such of the following activities as would be possible under staff and budgetary limitations:

- A. Where a watershed was in more than one local governmental jurisdiction, any of the local governments could request the AWA

to provide any coordination needed either in relation to improvements proposed or to improvement of water quality.

- B. A special committee could be established to work with the three counties, the Iowa Department of Soil Conservation and the County Soil Conservation Districts in the coordination of these programs with the 208 program for the reduction in non-point agricultural pollution.
- C. AWA would encourage and assist local governments to enact and enforce comprehensive programs to minimize non-point urban pollution, such as:
 - (1) Storm drainage standards for new developments such as retention basins, manhole diversions, screen separators, etc,
 - (2) storm drainage channels,
 - (3) land subdivision control,
 - (4) street surfacing and cleaning,
 - (5) snow and ice removal,
 - (6) erosion control during construction of public and private project,
 - (7) littering regulations, and
 - (8) floodplain and floodway regulations.

- D. Local governments would inform AWA of major new developments and changes in zoning and development regulations. Any major departures from the Land Use Intensity Plan would be made after consultation with AWA to determine the effect of such changes on the other parts of the 208 plan.

7. Preparation of Final Management System. A major responsibility of the interim AWA is the consideration of remaining options and the determination of the final management system in accordance with guidelines provided in the following section.

Funding and Staffing of Interim Agency

Activities of the interim agency will require a staff possibly provided by CIRALG as is done for the 208 program. This staff would be the core of the much larger staff of the permanent agency. Actual staff and funding requirements are to be determined.

Final Management Plan

The proposed inter-governmental agreement for an interim Areawide Wastewater Agency (AWA) provides for the study and analysis of a final or more permanent AWA. This could be accomplished by:

1. Use of Chapters 28E and 28F of the Iowa Statutes, possibly with some amendments.
2. Passage of complete new legislation that would apply only to the Des Moines 208 area.
3. Use of Chapter 358 which enables formation of sewer districts with some amendments. The entire 208 area would be organized as a sewer district under this approach.

Basic Objectives. The basic objectives of the Final Management Plan are to:

1. Enable compliance with EPA requirements for 208 Programs.
2. Enable establishment of a permanent water quality management system on an areawide basis. With a few exceptions such as in the case of the three counties, the individual local governments have the power needed to meet water quality management requirements. These are available for each unit of government individually, but there is no method or system to bring these together, to combine them into a coordinated areawide system.
3. Establish a viable areawide wastewater treatment agency with sufficient power and finances to enable it to apply the resources of the entire area to the areawide wastewater quality problems. Investigations made as a part of the 208 Program have indicated that a fragmented approach will not provide the needed improvement in water quality because significant parts of the 208 area cannot economically afford to install the facilities and improvements needed to enable them to reach a minimum standard of water quality. However, the resources of the entire 208 area (particularly when supplemented with state and federal grants) are sufficient to produce a solution to the wastewater problems, if these are approached on an area-wide basis.⁽¹⁾

The Area-Wide Wastewater Agency (AWA) would have the following characteristics:

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- (1) A well managed area-wide agency would have more influence on state and federal assistance policies and would be able to help the smaller local governmental agencies in obtaining such assistance which involves understanding of complex and ever-changing regulations and guidelines.

1. The name of the agency would include "Des Moines, Iowa" in order to identify the locality particularly for prospective bond buyers and thereby to take advantage of the excellent financial reputation associated with the name.
2. The area of jurisdiction of the AWA would be the 208 area as presently constituted. However, there would be provisions enabling the area of jurisdiction to be extended by annexation or for reduction in the area to take place after the AWA has been established.
3. The membership of the AWA should be the local governments within the 208 area, i.e., the 23 cities and three counties. This would enable the final management system to "evolve" out of the interim system. By the present or a different representation system, the members could elect a smaller Board of Directors to manage the AWA affairs. If the option to use Chapter 358 is chosen, the Board would be elected and the local governments bypassed in the choice of the Board.

The final AWA would have four basic types of functions. These would be: (1) construction and operation of facilities, (2) planning and monitoring, (3) coordination, and (4) stand-by functions. These may be described in more detail as follows:

1. Facilities Construction and Operation

- a. For the ICA,⁽²⁾ the AWA would own and operate all wastewater treatment facilities as well as the trunk sewers. The trunk sewers would include all sanitary sewers as defined,⁽³⁾ force mains and pumping stations. The trunk system would also include the combined trunk sewers within the City of Des Moines. All AWA operations would be in accordance with State regulations.
- b. The outlying communities could own and operate their own systems or the AWA could operate and finance these upon petition of and agreement with the outlying community and upon entering into a separate contract.
- c. New trunk sewers and facilities would be financed and built by AWA. If AWA finances do not allow construction of a facility municipal or developer financing could be used. Provided that AWA standards observed acquisition of the facility by AWA by gift or otherwise could occur subsequently.

2. Planning and Monitoring

AWA would have four planning and monitoring functions as follows:

- (2) The ICA is the area served by the proposed year 2000 trunk system that leads to the central treatment plant on the Des Moines River south and east of the City of Des Moines. Several major new trunk sewers will have to be built to serve this area and this construction would require some time. The boundary of the ICA could change as the area served by the central system changes. This, however, would introduce such difficult administrative problems and serious financing uncertainties as to make this impractical and to be avoided. When the AWA is established the Board should determine the ICA boundaries in accordance with the 208 Plan. The AWA should then assume responsibility for all trunk sewers and all wastewater treatment in the year-2000 ICA and impose its user charges uniformly over this area. If, in the future, a greater area is served, the Board could increase the ICA. There would be no decreases in this area as decreases would impair AWA financing.

- (3) See Phase I Report, Plate IV-3.

- a. Each year the Board would bring the 208 program up-to-date and transmit same to the governor's office. This could be done by a staff within the AWA or by a contract. Public hearings and other public participation would be a part of this process.
- b. Each year, the AWA Board would establish priorities for construction of wastewater treatment facilities and collection systems (as well as for other proposals of the 208 program) for all areas and communities within the 208 area. These would be established by the Board and would be transmitted to the Iowa DEQ and the U.S. EPA. Priorities would be established as a part of the AWA budgetary process. There would be public hearings and local input into the priority establishment system. This procedure would be an important part of the AWA capital improvement program.
- c. The Board may monitor and test water quality in the 208 area. The AWA could maintain its own laboratory for water quality testing purposes. This would be coordinated with the Iowa DEQ to avoid any duplication.
- d. The AWA would monitor all industrial discharges and levy and collect all industrial cost-recovery charges (meeting EPA requirements) as well as monitor discharges to determine applicable pretreatment requirements.

3. Coordination Functions

AWA would coordinate activities of Federal, State and local agencies in the attack on water quality problems. This would include the following:

- a. Urban Stormwater Program. To comply with the EPA 208 requirement that there be an urban storm run-off program, the

AWA would suggest and/or develop storm drainage management system where a watershed was in more than one local governmental jurisdiction. Storm drainage improvements proposed under such systems with the approval of affected jurisdictions would be constructed, financed and maintained by the local governmental units affected, utilizing existing governmental powers. The local government jurisdictions affected could contract with the AWA to provide service in connection with these programs. The AWA would be eligible to receive state and federal grants for these storm drainage programs and to act as the agent of the local governmental jurisdiction in dealing with them.

- b. Non-Point Agricultural Pollution, a major source of difficulty in connection with water quality within the 208 area, would be dealt with by the AWA by the establishment of a special committee to work with the Iowa Department of Soil Conservation and the County Soil Conservation Districts to coordinate activities of these agencies with the 208 program and to assist them in obtaining a higher level of public funding.
- c. Coordination with Iowa DEQ would include:
 - (1) Water quality standards established by DEQ could be monitored by AWA or the DEQ with monitoring results obtained by DEQ provided to the AWA.
 - (2) Effluent standards established by DEQ could be monitored by AWA with AWA reporting on compliance with standards to DEQ, or this procedure could be reversed. AWA would undertake daily monitoring of the wastewater treatment facilities under its control but would do surveillance monitoring only for those not under its control.

- (3) NPDES permits issued by DEQ could be monitored by AWA. AWA could monitor NPDES permits in outlying areas by request. AWA would assist local governments in complying with permit terms.
 - (4) Sewer construction permits now issued by DEQ for any construction serving two or more users should be first reviewed by AWA in order that the lateral and collection systems be coordinated with the trunk and treatment systems. Consideration should be given to DEQ delegating this entire approval system to AWA.
 - (5) Solid waste disposal, mining and quarrying and feed lot regulations would remain the responsibility of DEQ with AWA undertaking an occasional water quality monitoring activity.
- d. Joint activities would be necessary between the AWA and the local governments. These are specified in the subsequent section of the plan.
- e. Voluntary joint activities to improve water quality would be carried on by AWA with the local governments. These would include:
- (1) Conservancy Districts and County Soil Conservation Districts would be assisted by the AWA agricultural committee. AWA would monitor agriculturally-related pollution and soil loss limits. Trends in agricultural practices insofar as their effects on water quality would be reviewed and AWA would develop a program of assistance (including financial) for further improvement of these practices.
 - (2) County Boards of Health responsibilities for control of septic tanks and other individual or small treatment systems would

not be changed. However, AWA would assist by monitoring and investigating areas where septic tank and other such systems are causing problems and would assist county governments in reaching solutions to them.

- (3) County governments do not have authority to build lateral collection systems and assess the cost against the area served, although this might be included in county home rule legislation now being considered. There are a number of developed unincorporated areas where this needs to be done. AWA would assist in obtaining the necessary legislation and would work with county governments in financing and building the collection systems.
- (4) City and County Governments would be encouraged to enact and enforce comprehensive programs designed to minimize non-point urban pollution. AWA would suggest minimum standards and encourage enforcement of, or programs in connection with:
 - (a) Storm drainage standards for new developments such as retention basins, manhole diversions, screen separators, etc.
 - (b) Storm drainage channels
 - (c) Land subdivision control
 - (d) Street surfacing and cleaning
 - (e) Snow and ice removal
 - (f) Erosion control during construction of public and private project
 - (g) Littering regulations
 - (h) Floodplain and floodway regulations

4. Standby Authority

The AWA would have standby authority to contract with local governmental units for the provision of entire sanitary sewer systems, including collectors and laterals, to provide storm sewer trunk and lateral systems and to provide complete wastewater service. There should also be a standby authority for the AWA to provide water supply and distribution services by contract. These can all be done under Chapters 28E and 28F of the Iowa Statutes. It would be essential for AWA to maintain a good cost accounting system for this and for other purposes.

Local Government Obligations. Sanitary sewer collection and treatment services would be provided by AWA with all of the units of local government in the ICA and with any of those of the 13 outlying communities that desire to use the AWA services. In consultation with local governments, AWA would develop minimum standards and each local government in the ICA would:

1. Require sanitary sewer connection permits and enact and enforce plumbing and building regulations including those that prevent foundation and roof drains from being hooked up with the sanitary sewer system. Fees for these permits would belong to the local governments;
2. Enforce minimum standards regulating characteristics of materials discharged into sanitary sewers;
3. Inform the AWA of major new developments and changes in zoning and development regulations. Further, the local governments would agree not to undertake major departures from the Land Use Intensity Development Pattern without consultation with AWA to determine the effect of such changes on the sanitary trunks or

treatment facilities. If such changes would necessitate a replacement, enlargement or duplication of sanitary sewer trunks of treatment facilities, AWA would determine the needed improvements as well as their costs. After a public hearing, the AWA would determine whether or not it should undertake such improvements. If the AWA determines that such improvements should not be made, the local unit of government would have the option of making and financing the improvements; and

4. Develop, adopt and finance programs for the reduction of infiltration and inflow in the sanitary sewer system; enact ordinances, or changes in ordinances, necessary to reduce excessive amounts of infiltration/inflow.

AWA would have the authority to establish enforcement measures for municipal obligations in the ICA. Contracts between AWA and outlying communities would include agreements covering such obligations.

Ownership. The AWA would assume ownership of trunk sewers and treatment facilities within the ICA and those outlying communities desiring to use AWA services. Trunk and treatment facilities would be purchased by AWA through an assumption by AWA of the debt that has been occasioned by construction of the trunk and treatment facilities by paying to the local government each year a sum equal to retirement and interest payments for that year.⁽⁴⁾ Reserve funds accumulated to retire such debt would be used to postpone AWA payments until the reserve funds are exhausted.

Existing sewer districts in the 208 area should be eliminated as a part of the management plan. Legislation establishing the AWA could provide for

(4) Consideration should be given to other means of compensation as considered by the management committee.

this with the AWA assuming responsibility for debt payments and the cities taking over the lateral and collector sewers. A special legal analysis will need to be made of the best method to accomplish this and this method would differ if the 208 area is organized as a sewer district.

AWA should have the authority to assume the operation and maintenance of a trunk sewer and to postpone assuming ownership until the trunk sewer has been placed in a satisfactory condition, until any law suits based on its adequacy or condition have been settled, or until an agreement concerning AWA liability has been negotiated with the local government.

Financing. It is important that the AWA have as flexible a financing system as possible so that it can pay its costs in the most reasonable way possible. The following are more important elements of the financing system:

1. Costs of planning, monitoring and coordination as previously defined would be paid for by a real estate tax levied against the entire 208 area.⁽⁵⁾
2. Construction and operation and maintenance of the wastewater trunk collection and the wastewater treatment facilities within the ICA and within any outlying communities desiring to use AWA services would be financed by a user charge. The user charge would be based on the amount of water used by each individual user and would conform with EPA requirements. The user charges would be uniform throughout all areas served by the AWA. (Some exceptions might be made or a differential rate used where a larger water user pre-treats sufficiently.) Standard EPA regulations for

(5) The alternative is to charge these costs against the local governments on the same basis as the voting. The difficulty with an assessment scheme is that only parts of the three counties are in the 208 area and the counties would not be able to pay an assessment without charging persons who do not live in the 208 area.

user charges and for industrial cost recovery would be used when federal grants were a part of the financing. User charges would be established each year by the Board as a part of the budgetary process. Existing intergovernmental sewer contracts would be cancelled at the time that the AWA goes into operation.

3. AWA would have the power to apply for, receive and spend federal grants either directly or on a "pass through" procedure.
4. The AWA would be able to issue short-term income anticipation notes to finance its operations pending collection of user charges.
5. The AWA by action of its Board could issue revenue bonds for capital improvements based on the user charges. To make the revenue bonds saleable, revenues would have to cover operation and maintenance facilities, other fixed obligations and costs and bond interest and amortization, with a coverage factor of probably 1.2 to 1.5. Thus, if revenue bonds are issued, it would be necessary to have the user charges higher than the actual money required for bond amortization and interest, purchase payments, and for operation and maintenance of the system.
6. AWA would have the authority to issue general obligation bonds backed up by the ability of the AWA to impose a real-estate tax to amortize and pay interest on the bonds. AWA would not have to impose the real estate tax; it would just be necessary for it to have the authority to do so. The bonds could be amortized by the user charges. However, with the ability to impose the real estate tax, it would not be necessary to have such an extensive bond coverage as would be the case with revenue bonds. Furthermore, considerable sums of money could be saved as the general obligation bonds could be issued at a lower interest rate.

Staffing and Budget. When in full operation, the permanent AWA as described above would have a total staff of about 125 to 150 persons and a total budget of \$3,000,000 per year, about ten percent of which (\$300,000) would represent administrative, coordination and planning expense. The administrative and planning costs of the final agency would be about twice those of the interim agency.

Time Table. A time table must be agreed upon prior to design and/or construction of any wastewater facilities that serve more than one political jurisdiction. A possible time table for putting the management plan into effect would be:

- | | |
|--|-----------------------------------|
| 1. Interim management plan and interim AWA | April, 1977 -
April, 1979 |
| 2. Enact new AWA legislation | by March, 1979 (+) |
| 3. Elect first AWA Board | April, 1979 |
| 4. Interim financing for AWA, filling of key staff positions, establishment of first AWA budget, rate charges, acquisition of trunks and treatment plants, transfer of employee arrangements, etc. | April, 1979 to
June 30, 1980 |
| 5. AWA first year of full operation | June 30, 1980 to
June 30, 1981 |

CHAPTER V - ENVIRONMENTAL EFFECTS OF THE PROPOSED PLAN

General Approach to Assessment of Environmental Effects

Environmental input was provided at many steps in the planning process. In particular, these were: (1) an inventory and analysis of existing physical, biological, social and economic conditions in the study area (Work Elements 30 and 32); (2) an investigation of land use and water quality relationships as they affect planning in the study area (Work Element 34); (3) development of a baseline projection of relevant environmental, social and economic factors (Work Element 52); (4) screening of subplans with respect to environmental effects (Work Element 59); (5) the establishment of significant environmental restraints relating to water quality (Work Element 61); and (6) the screening of areawide plans with respect to environmental effects (Work Element 70). This report is the final step - an overview of the environmental impact of the preferred plan.

Steps 4 and 6 also provided opportunity for resident professional personnel and private citizens in the study area to examine environmental information and its use in relation to the overall planning effort.

Impacts on Water

The proposed areawide plan is a combination of subplans for the reduction and control of point, intermittent-point and non-point sources of pollution. Alternative subplans were developed in each area on the basis of existing water quality data and on water quality projections made with the Storm Water Management Model (SWMM).

The existing water quality and quantity data, summarized in Chapter II of this report, serve three important functions in assessing the environmental impact of the proposed plan. They give a general overview of the existing water quality and quantity in the 208 study area; they identify areas where water quality and quantity problems exist and thereby assist in locating specific sources of pollution; and they use existing water quality data for calibration of the stormwater management model. Calibration is an essential step in the development of a valid model capable of predicting water quality under varying conditions of stream flow, temperature and waste input. Calibration requires a data base compiled for a particular stream condition or event. The state of the art in receiving water modeling allowed for the adjustment of modeling parameters in order to simulate actual stream quality within reasonable accuracy.

Model calibration for the 208 study entailed fitting the computer model to known and estimated low-flow quality and quantity information and adjusting the model coefficients (i.e., reaeration decay, roughness, etc.) that has not been specified by known or measured values.

After model calibration dry and wet weather conditions were modeled under present and future conditions. Projecting water quality conditions is useful in developing options for the control of pollution sources - it allows for the evaluation of future land use plans, crop management plans and point-source management plans, with regard to their effect on water quality and quantity in the study area. Various control options and subplans were modeled for non-point and intermittent point sources of pollution. Reductions in mass loadings of pollution with respect to existing conditions were generated for point-source control options and subplans, and resulting water quality conditions in the receiving streams were simulated.

The proposed plan would reduce wasteloads (BOD, suspended solids and ammonia nitrogen) discharged to receiving streams by approximately 60

percent due to the point source control strategy. Intermittent source wasteloads (including fecal coliform bacteria) would be reduced by approximately 30 to 50 percent. Non-point source wasteloads would be reduced by approximately 60 to 70 percent.

While the point-source control portion of the proposed area wide plan would have little effect on water quantity in the study area, it would have a major impact on surface water quality.

Under both 1975 conditions and dry weather conditions, streams such as Fourmile Creek, Camp Creek, and North River exhibit D.O. concentrations below 4.0 mg/l, ammonia-nitrogen levels in excess of 2.0 mg/l, and fecal coliform counts in excess of 18,000 MPN/100 ml. Although standards are not violated in these general classification streams under dry weather conditions, the water quality in these streams under 10-year, 7-day low flow is poor. The water quality in the Raccoon River is very good under these conditions because no wastewater is discharged to it in the 208 study area. Beaver Creek, however, exhibits a multitude of water quality violations during 10-year, 7-day low flow conditions. Dissolved oxygen levels lower than 3.0 mg/l, ammonia-nitrogen concentrations in excess of 3.0 mg/l, and fecal coliform counts totaling more than 60,000 MPN/100 ml occur. These water quality violations appear to be due to the wastewater discharges from the Grimes and Urbandale treatment plants.

The middle Des Moines River (from Saylorville Dam to the Raccoon River) exhibits very good water quality due primarily to the insignificant pollutant loading it receives either directly or from its various tributaries. However, the lower Des Moines River (Raccoon River to Red Rock Reservoir) does exhibit dissolved oxygen and fecal coliform violations during low-flow conditions. The dissolved oxygen concentration reaches a minimum of approximately 4.2 mg/l about ten miles below the Des Moines main plant. In addition fecal coliform counts approach 80,000 MPN/100 ml in the Des

Moines River immediately downstream of the Des Moines main plant. Although it is apparent that these violations during low flow conditions are caused by the discharge from the Des Moines Main plant it should be noted that the Des Moines River recovers to meet stream standards about 20 miles below the plant outfall.

In summary, violations of the state's water quality standards under 10-year 7-day low-flow conditions occur on Beaver Creek due to discharges from the Grimes and Urbandale plants, and on the Des Moines River due to the discharge from the Des Moines main plant.

Under the proposed plan, many outlying wastewater treatment plants will be eliminated. Water quality in Beaver Creek would improve substantially. Winter D.O. levels and summer and winter ammonia-nitrogen concentrations would be well above state standards. D.O. concentrations during the summer months at Q_{10-7} may drop slightly below average standards in Beaver Creek due to the Grimes discharge, but overall improvement in water quality will be significant.

In the Des Moines River, under low flow conditions, water quality improves greatly under the proposed plan. Dissolved oxygen, ammonia-nitrogen, and fecal coliform levels all fall within water quality standards.

Under wet weather conditions, both water quality and water quantity (to a lesser extent) would be affected by the implementation of the proposed plan. During Phase I of the 208 planning process, the 1 year - 24 hour, 5 year - 24 hour, and 10 year - 24 hour storm events were modeled. Results of this modeling effort appear in the Phase I report. The effect on area receiving streams varied greatly. An evaluation of the pollutional impact of wet weather on Beaver Creek begins with an inspection of dissolved oxygen concentrations. Average dissolved oxygen values for the 1-year, 5-year and 10-year 24-hour storms were similar with values above 5.0 mg/l at all

locations except one. At Beaver Creek river mile 16.8 average dissolved oxygen levels were determined to be approximately 3.0 mg/l with the 10-year storm having the highest value of 3.72 mg/l and the 5-year storm having the lowest dissolved oxygen level of 2.93 mg/l. These values would appear to be below the Iowa Department of Environmental Quality's required daily minimum for dissolved oxygen of 5.0 mg/l.

Average fecal coliform concentrations in Beaver Creek for the modeled storms generally increased toward the creek mouth. While values for all three storm events were of the same order of magnitude, concentrations occurring during the 10-year storm were consistently the highest. Maximum values in Beaver Creek were over 40,000 MPN/100ml.

Dissolved oxygen concentrations for Walnut Creek indicate concentrations above the State's standards at all locations for the three modeled storm events except at the creek mouth during the 1-year storm. The dissolved oxygen value at this point was 1.31 mg/l during the 1 year storm. Dissolved oxygen concentrations for the 5-year and 10-year storms at the mouth of Walnut Creek approached 8.0 mg/l. Fecal coliform concentrations in Walnut Creek were consistently higher during the 10-year storm event than during the other storm events modeled, with a maximum of about 70,000 MPN/100 ml.

An evaluation of the polluttional impact of the three modeled wet weather conditions on the Des Moines River involved not only runoff, dry weather point source dischargers, and wet weather point source dischargers, but also other sources of polluttional loading to the river. These other sources include the flows and loads from Beaver Creek, Walnut Creek, and Raccoon River and both storm and combined sewer overflow loadings from the City of Des Moines and other sewered areas. During wet weather modeling, the dissolved oxygen limits fell below minimum State standards from river mile 204 to 206 (the two-mile reach below the confluence of Beaver Creek and the

Des Moines River). Ammonia nitrogen concentrations exceeded 2.0 mg/l from river mile 198 to 206 (the eight-mile reach between the confluence of Beaver Creek and the Des Moines River and Highway 69 bridge). Also, fecal coliform concentrations above 2,000 MPN/100 ml were evident from river mile 190 to 196 (the six-mile reach below the Des Moines Main sewage treatment plant outfall). Although these levels do not seem extremely critical when compared with historical river data, a consideration of the baseline flow rates preceding the 10-year storm in the Lower Des Moines River (12,000 cfs from Saylorville Dam and 4,000 cfs from Raccoon River) indicate a considerable mass loading of pollutants and, consequently, a potential for water quality problems.

Other major sources of water quality and quantity problems have been evaluated throughout the 208 planning process. Intermittent and non-point sources such as urban and agricultural runoff, storm and combined sewer overflows, and various point - non-point sources received engineering considerations and computer modeling efforts to evaluate their impact on the study area receiving streams. Results of these investigations are reported in Work Elements 55, 56, 57, 59, and 70.

Under the intermittent point source control portion of the proposed areawide plan, separated sewage will be removed from the combined sewer system, thereby decreasing both flow and waste concentration from the combined system. Also, flow separators would be installed at selected combined and storm sewer discharge points. These control options will greatly reduce polluttional loading to the Des Moines River. This would have a substantial effect on improving water quality and reducing water quality violation. It should be noted that the intermittent controls will not reduce the overall quantity of wastewater generated.

Under the non-point source control portion of the proposed plan, pollution loadings to all receiving streams will be greatly reduced. This

control subplan, together with the point source and intermittent point source control portions of the proposed plan, will eliminate all water quality violations in major receiving streams in the study area.

Projections (year 2000) made with the SWMM model showed that future development in the area would increase the quantity of non-point pollution compared with present quantities and conditions (Table V-7, CIRALG, 1976a). However, by modifying future development to minimize water quality impact and by increasing measures to minimize agricultural runoff, projected pollution was substantially reduced in all parameters.

In summary, the environmental impact of the proposed areawide plan on water quality and quantity must be viewed with three main considerations. First, modeling results indicate that the proposed plan will substantially improve water quality in the study area when compared to existing conditions. It will eliminate water quality violations which presently exist in the area's receiving streams under both critical dry and wet weather conditions; this is one of the main purposes of the 208 planning process. It will also tend to reduce the quantity of wastewater generated in the study area to a limited extent.

Secondly, the proposed plan does not appear excessive in its control requirements. Although water quality violations indicated by the modeling and by existing data are eliminated, the plan does not require controls to such an extent that excessively good water quality results, or that implementation and operation costs are excessive.

Thirdly, the overall proposed areawide plan is a combination of three source-specific subplans. In order to obtain the overall objectives of the 208 plan, all pollution sources (point, intermittent, and non-point) must be addressed and controlled. Although overall implementation of the proposed areawide plan will obviously be a phased project, the acceptable results with

regard to improved water quality depend not on one source option control alone, but implementation of all three source control portions of the plan.

Impacts on Air

There are two air pollutants for which maintenance plans have been prepared for Polk and Warren Counties: carbon monoxide and suspended particulates. In the City of Des Moines auto exhaust emissions account for approximately 90 percent of the carbon monoxide (CIRALG, 1974). Auto engines themselves emit only a small fraction of suspended particulates, but they can generate a large amount of fugitive dust depending on roadway and weather conditions. Urban and non-urban land surfaces in the study area contain sources of fugitive dust - unpaved roads and parking lots. Industrial air emissions are under good control in the study area at the present time (Moss, 1975).

The proposed plan would have no major primary impact on the air quality of the City of Des Moines or the region. No sludge incineration is anticipated, and air emissions from the proposed collection and treatment facilities will be minimal. Odors will be controlled to meet city standards. During construction locally disruptive fugitive dust can be generated depending on weather and soil-water conditions during excavation.

The proposed plan will have a positive impact on air quality maintenance in the long run through its designation of permanent open space areas and corridors in the intensity development pattern. These areas will serve as sinks for a certain fraction of the air pollution in the vicinity and they also serve to decrease the overall density of air-polluting land uses.

The form of growth anticipated in the area will require continued strong reliance on the private automobile. This will cause the potential for carbon monoxide pollution to rise; the potential will be held in check by the success

of auto manufacturers to design and build low emission engines. The development of an areawide mass transit plan could aid in controlling air pollution, but no active planning is currently underway for this option.

Impacts on Land Use

The procedures followed in developing the areawide wastewater management plan were designed to focus early in the study on the interrelationships between land use and water quality. Thus an Intensity Development Pattern (Land Use Plan) was utilized as the base for the future point, intermittent point and non-point source plans which make up the areawide plan.

In developing the Intensity Development Pattern (IDP), analyses of land use relative to water quality, detailed soil capability and environmental analyses were made for the area. In addition, local policies as represented in each jurisdiction's comprehensive plan and policies were evaluated. Alternative IDP's were formulated and included: (1) Minimum Public Expenditures Pattern, which was based on limited public expenditures for additional utilities systems; (2) a Minimum Environmental Effect Pattern, based on land use decisions to achieve minimum negative environmental effects; and (3) Composite Pattern, based on present development plans for local governments adjusted to reflect regional population estimates. The IDP selected, after public hearing, involved key parts from each. The Composite Plan was adopted, with adjustments to include selected elements of both the Minimum Public Expenditures Pattern and the Minimum Environmental Effects Pattern. Thus, the IDP selected reflected environmental and cost considerations as well as the political realities of the area.

The IDP was used as a basis for development of the Areawide Wastewater Plan. Point source flows and run-off and intermittent flows were developed, wherever possible, from the IDP. Many of the non-point source areas of concern were an outgrowth of the environmental analysis.

Because of the desirability of providing a regional treatment facility, the final areawide plan includes serving suburban and satellite communities such as Ankeny, Altoona and Bondurant through the extension of large trunk sewer lines through undeveloped agricultural land in unincorporated areas. (See Plate V-1.) The Management Plan calls for control of development pressure along these trunk lines (which under the IDP are to remain in agricultural use) by a coordinated program based on the construction permit requirement by Iowa DEQ. Approval by DEQ of a permit to construct would be based in part upon design capacity of the trunk line and the allocation of wastewater treatment units for a jurisdiction as reflected in the IDP. The AWA (through CIRALG) would have responsibility for local conformance with the water quality portions of the IDP and would provide to DEQ the waste treatment units allocated to each local jurisdiction. The procedure is somewhat complex, and limiting development will be most difficult to accomplish. It will require the desire and cooperation of the affected local jurisdictions. This will be the major impact of the Areawide Wastewater Management Plan on land use.

A major element of the non-point program could be the restriction of development in unincorporated areas. This would be accomplished by requiring very large lots (such as three to five acres) before a permit to use a septic tank could be granted. This would direct urban growth into those areas served by the sanitary sewer systems. This should not overload the sewer systems because their capacities are designed to accommodate projected growth and to allow reasonable flexibility.

The impact of the Areawide Wastewater Management Plan on existing development will consist primarily on the disruptions and other problems associated with new construction through developed areas, as well as the improvement in value and desirability of land uses for which plan improvements will reduce water quality problems (such as basement back-ups and septic tank failures). Specific impacts would be:

V-11

PRELIMINARY INTENSITY DEVELOPMENT PATTERN - YEAR 2000 -

-  RESIDENTIAL - LOW DENSITY
(LESS THAN 1 D.U./ACRE)
-  RESIDENTIAL - MEDIUM DENSITY
(1 TO 4.9 D.U./ACRE)
-  RESIDENTIAL - HIGH DENSITY
(7 OR MORE D.U./ACRE)
-  NON-RESIDENTIAL
LOW INTENSITY
-  NON-RESIDENTIAL
LOW INTENSITY (SPECIAL)
-  NON-RESIDENTIAL
MEDIUM INTENSITY
-  NON-RESIDENTIAL
HIGH INTENSITY
-  CROPLAND
-  PASTURE, FOREST & VACANT
-  PERMANENT OPEN SPACE
-  WATER
-  PROPOSED MAJOR TRUNK LINE
-  PROPOSED REGIONAL TREATMENT
FACILITY
-  OTHER TREATMENT FACILITIES
-  AREA SUBJECT TO DEVELOPMENT
PRESSURES FROM TRUNK LINE
LOCATION

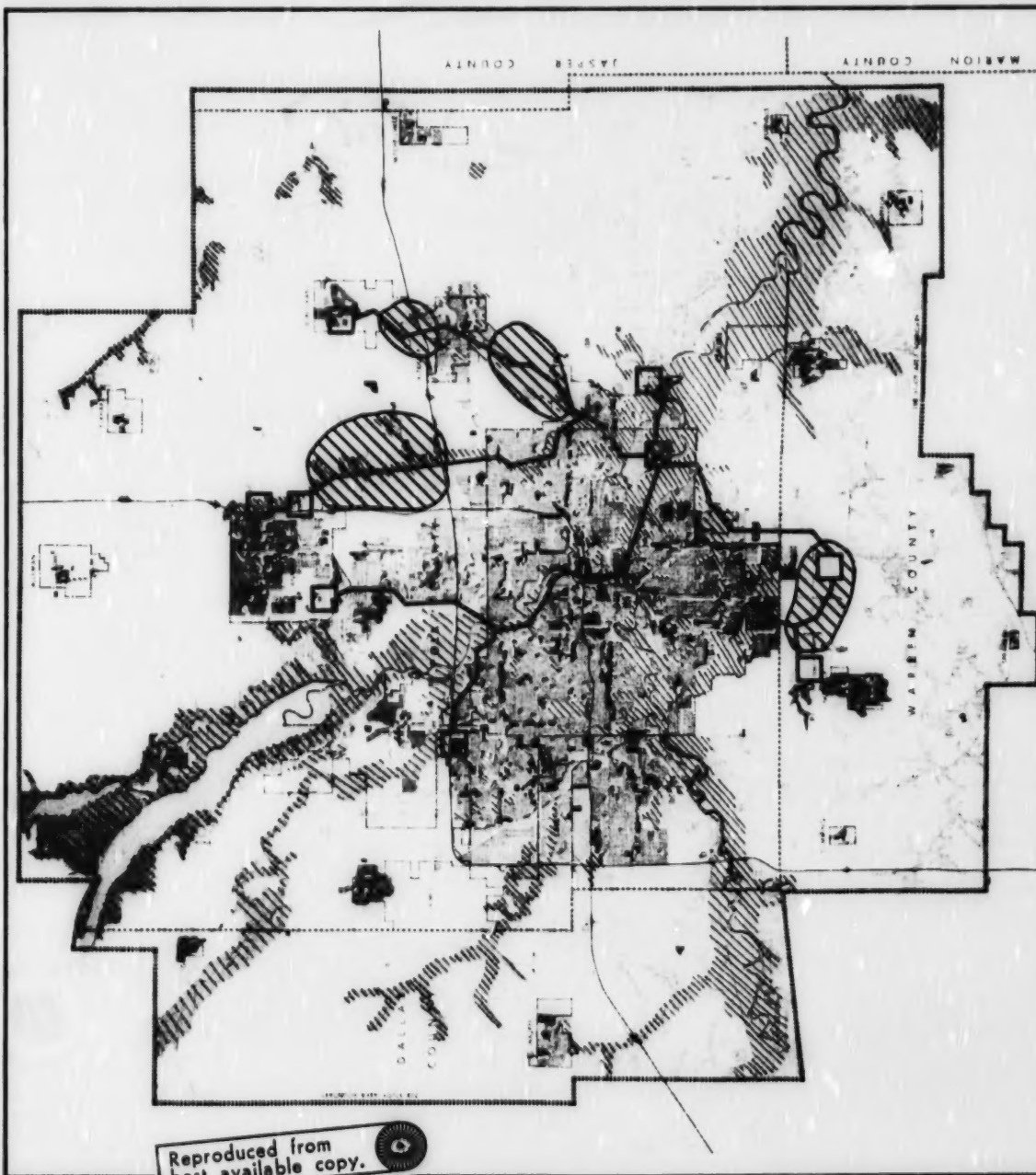
SCALE IN MILES
0 1 2



creba CENTRAL IOWA REGIONAL ASSOCIATION
OF LOCAL GOVERNMENTS

KX KIRKHAM MICHAEL AND ASSOCIATES
HARLAND BATHOLONEW AND ASSOCIATES
AMERICAN CONSULTING SERVICES, INC.
TENEC ENVIRONMENTAL CONSULTANTS,
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FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972



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1. In the ICA the construction of sewer trunk lines through developed areas will cause temporary disruption of land uses. In most instances the trunk lines follow the stream valleys, where minimal disruption to urban development occurs. However, the ecosystem would be temporarily impacted in the natural areas.
2. Within the ICA, the interceptor system for segregating the combined system through the developed areas will disrupt the urban land uses that are adjacent to it. Where this involves location in a street it will be particularly disruptive to residents and to street traffic for a short period of time.
3. Construction of flow separators at points throughout the ICA will have a disruptive impact during construction. The land area required for a flow separator is relatively small (less than one acre). They will be located either in the downtown area or along trunklines following a stream. Construction in the downtown area will be temporarily difficult and disruptive. When completed, the flow separators will be totally underground and the land use can be resumed without adverse impact.
4. Within the ICA, the construction and location of equalization basins may have adverse impacts. An equalization basin could have as much as 10 to 15 feet of the structure above grade and will be a sizeable physical structure relative to other uses. In many cases, these have been located in areas where abandoned lagoons exist and where they are well separated from adjacent residential uses. Surrounding land areas could be graded and landscaped to minimize visual intrusion.
5. The additional sewage capacity provided to the entire ICA by the point source improvements (including trunk line extensions) will

improve the overall health, desirability, and aesthetics of the urban area, which now has marginal or less than satisfactory point-source control.

6. The ability of the regional system to sewer homes presently on septic tanks in the corridor between Ankeny and the City of Des Moines would increase the quality and health conditions of that area for residential development. Other areas which are presently served by septic tanks and would be picked up in the southern part of the ICA would be helped as well.
7. In the outlying communities there would be some disruption associated with construction of new trunks or treatment facilities, or expansion of existing treatment facilities. At the same time, the ability of the new facilities to alleviate existing problems would make each community a more desirable place to live.
8. The enforcement by local government of erosion controls for construction sites would be particularly helpful to those existing land uses in the areas where new development will take place. With new construction required to meet erosion standards, the property owners will be protected from damage to the storm water system and sedimentation on their property.

The land use pattern which exists today would not be significantly altered. Travel patterns and other service patterns such as solid waste disposal would not change from the present pattern.

Land Use Impact on Anticipated New Development

Future development in the 208 study area would be greatly affected by the location and timing of the Implementation Areawide Wastewater

Management Plan. The projection of population for the study area calls for a population growth to 400,000 by the year 2000. The development of the utility system would help the region to meet the 400,000 population projection by making the community more attractive to industry and to residential growth than it has been during this moratorium period. The Des Moines Area can market itself as a metropolitan area which has come to grips with the problems of wastewater management. It would have instituted a management system and the technical plans necessary to provide for its future. Future industry and other investment will see this as an example of a farsighted community and location in the Des Moines area will be much more attractive to it.

Impacts of the plan on new development in the 208 area are listed below:

1. Within the ICA the extension of trunk lines through undeveloped agricultural portions of the unincorporated areas can be expected to be the most critical land use problem resulting from the plan. Easements would be required from land owners who in turn would have to be told that they cannot tie on to the trunk line which extends through their property unless the projected population and land use is in conformance with the adopted IDP and technical requirements. The value of the land surrounding this trunk line would increase and the desire of those owning the land or land around to subdivide or to develop would increase. Under any circumstances it would be extremely difficult to keep involved communities or counties from revising the intensity development pattern and thus permitting development along the trunk lines. The three to which this applies are those shown on Plate V-1: (1) the area between Des Moines and the East Ankeny treatment plant; (2) the area between Pleasant Hill and Altoona and between Altoona and Bondurant; and (3) the area from Lakewood subdivision to south

Des Moines, in Warren County. One of the outcomes of this problem may be the annexation of portions of the unincorporated area by adjacent cities and eventual revision of their allocation of land use.

2. The development of the west trunk from Des Moines to the West Ankeny plant would open up that corridor for development. This is in conformance with the IDP and would allow such development to take place with sewer service.
3. As a result of the development of satellite cities and suburban cities, some agricultural land which might be kept in production would be utilized for residential and commercial/industrial development.
4. As a result of the expansion of the satellite cities, some additional travel costs and increased travel patterns between these communities and the urban center can be expected. Only limited growth is expected in the outlying communities; upgrading existing facilities will have only minimal effects on growth of these cities. As in the usual case, the wastewater system for smaller localized cities follows development resulting from other influences.

(The proposed freeway through the eastern and southern sectors of the central urban area was not included in 208 considerations because completion was not considered likely prior to the year 2000.)

Biological Impacts

Rare/Endangered Species

The preferred plan has no identifiable, direct impact on the status of rare/endangered plant or animal species in the study area. Land areas

directly affected by proposed facilities construction have already been disturbed by urban and agricultural land uses to the extent that potential habitats of rare/endangered species are destroyed or irretrievably altered.

In order to protect habitat space in the study area where native plant and wildlife species (including endangered ones) can persist or thrive, permanent open space must be protected in the vicinity of Saylorville Lake and Big Creek Reservoir, the old channel of the Skunk River and the Raccoon River floodplain area - particularly the Dallas County and southeast Polk County portions. These areas all offer wetland and wooded habitats. The proposed Intensity Development Pattern, where applicable, provides this protection. The Iowa State Conservation Commission is working for the protection of additional prairie remnant sites, including one site in the northern part of the study area now privately owned.

Wildlife Habitats

Wildlife habitat areas in the study area other than those just mentioned are the Des Moines and Raccoon Rivers and all their tributaries, Dale Maffit Reservoir, Brenton Slough (Beaver Creek South of Granger) and the State and County parks mentioned earlier in this report. Operation of the areawide treatment plant proposed in the plan along with the proposed control of combined and storm sewer overflow discharges to the Lower Raccoon River and Des Moines River between Birdland-Union Park and the present treatment plant will improve quality to the extent described in the Water Quality section of this Chapter, beginning approximately two to four years from now. Improvement in cropland runoff controls proposed in this plan will also improve water quality in a significant way starting in about five years from now. These improvements in water quality will gradually improve conditions for fish and other aquatic animal species in the study area. Perhaps the most significant positive impact of water quality on aquatic animal habitat will come from reduced pollutant loadings on small tributary

streams in outlying areas as a result of agricultural non-point pollution controls. The most important positive impact of the plan on terrestrial wildlife habitats would be in protecting the floodway corridors along the Raccoon, Walnut, Beaver, Des Moines, Four Mile, Middle and North Rivers (Creeks) as called for in the Intensity Development Pattern. (See Plate V-1.) In each case composites of aquatic, wetland, floodplain forest and gradations toward upland forest habitats are protected to the long-term benefit of plant and animal species.

The impact of the plan on eutrophication of waterways in the area and its resultant impact on aquatic wildlife is not easily predicted. The operation of Saylorville Dam and Lake will have a profound impact on the ecological dynamics in the Des Moines River through the study area regardless of the impact of the proposed 208 plan. Improved control of nutrient-rich runoff from cropland may help slow eutrophication slightly, but the effect of residual nutrients in lake and reservoir sediments (particularly phosphorus) will continue for a long time even if there is a marked decrease in nutrient inputs.

Crops and Managed Vegetation

The proposed plan recognizes the prime importance of agricultural productivity to the study area and the Nation. There are approximately 351,000 acres (68 percent of the study area) now used for cropland, and 322,000 acres (63 percent) are projected to remain in cropland by the year 2000. Intensity Development Pattern alternatives calling for a smaller decrease in cropland were considered socially and economically unfeasible. Water and soil conservation measures recommended by the plan as non-point source pollution control measures would contribute to the maintenance of crop productivity with lower levels of fertilizer supplementation. These measures are also critically important to the protection of long-term soil fertility and agricultural potential.

Impact on Environmentally Sensitive Areas

Sources of Potable Water

The lower Raccoon River Valley is protected in the proposed plan by its designation as permanent open space to the limit of the 100-year floodplain. The floodplain of two major tributaries, Sugar and Walnut Creeks, are also designated as permanent open space. This designation by the plan is a minimum requirement for these areas; additional protective measures may be required in the coming years to minimize the potential hazard brought by contaminated runoff or contaminated groundwater moving in the watershed toward the lower Raccoon. A limit on all direct discharges to the Raccoon River for a five-mile zone extending upstream from the intake galleries (approximately to I-35) is also a minimum requirement (Johnson, 1976); additional limitations may be advisable or required in the future, depending on water quality received at the treatment plant. An area about which very little is known but which may represent a potential health hazard is the quantity, impact and protection against viruses in potable water intake.

It is critically important that all aspects of the water quality management plan proposed here which directly or indirectly affect the quality of water in the lower Raccoon River be reviewed carefully and at regular intervals in relation to water quality data at the potable water intake site(s).

Surface Waters

The short-term (approximately five-year) impact of the plan on quality of surface water would result from controlling polluted discharge from combined sewer systems discharging to the lower Raccoon (downstream of the water treatment plant) and to the Des Moines River in the City center of Des Moines. Longer term improvement (approximately 10-year) can be

expected as a result of non-point source control in agricultural land areas. Lake Red Rock would improve gradually as a result of these combined positive impacts, but over a longer period of time.

Wetlands

The plan would prevent further degradation of wetlands in the study area by curbing soil erosion through practices as non-point source controls in agricultural land and by protecting the floodplain areas designated in Plate II-4 from development.

Floodplains and Flood Retention Areas

The plan recommends that all 100-year floodplain areas be designated as permanent open space. The policies for management and use of these areas are being formulated or will be formulated by individual units of local government and the Corps of Engineers during the next several years. Any excavation or construction in the flood retention area of Lake Red Rock decreases flood retention capacity must be compensated for by the creation of an equal amount of new flood retention capacity nearby in the flood pool areas.

Groundwater Recharge Areas

The most significant groundwater recharge areas coincide with the 100-year floodplain designated in Plate II-4. The plan recommends retention of these areas as permanent open space with specific use limitations as designated by individual units of local government.

Prime Agricultural Lands

The plan calls for the retention of over 90 percent of the present cropland through the year 2000.

Public Outdoor Recreation Areas

There is potential conflict in several cases between proposed equalization basins and existing or proposed outdoor recreation areas. (City of Des Moines Plan and Zoning Commission, 1976.) In most, if not all, such cases the conflict could be resolved by basin design and placement which would minimize or prevent any interference with recreational land uses. In fact, the basin surface may itself serve as a recreation area, for example, tennis courts. There would, of course, be initial disruption during basin construction; periodic maintenance and repair would cause minor interference with recreational land uses. Odor would be controlled by built-in abatement systems.

The first area of possible conflict is at the proposed equalization basin site north of S.W. 80th Street (County Line Road) near the southern extension of Fleur Drive (Highland Hills). A neighborhood park proposed for this area would serve residents south of Army Post Road, west of S.W. 9th Street and north of S.W. 80th Street.

The second area of possible conflict is the proposed equalization basin site near Prospect Road directly east of Broadlawns Hospital. This is part of Prospect Park (now a community park - to be reclassified). The exact site proposed for the basin is now used as a refuse dumping area, therefore, the net result of placing the basin could be significant and positive for the area as a whole.

The plan has a positive impact on recreational use of the Des Moines River and riverfront areas. Improved water quality and increased access will benefit recreation.

Sensitive Geological Areas

The bedrock beneath the Pleistocene mantle of glacial drift, loess and river deposits in the study area consists of shale with interbedded limestone, sandstone and thin coal seams. While there had been extensive coal mining activity in the Des Moines area earlier in the century, the prospects for returning to commercial production in this area do not appear very high at the present. A statewide inventory of coal resources now in progress will shed more light on this matter (Avein, 1975).

A potential problem caused by the extensive coal mining activity earlier this century is that much of south-central Polk County is underlain by shallow, mined out voids in the upper bedrock layers which represent possible subsidence areas. The incidence of subsidence to date is low, however, and the chance of major subsidence appears to be very low.

An underground (bedrock) storage area for liquid petroleum gas is located in Pleasant Hill with substantial storage volumes at depths of 500, 900 and 1,400 feet (Dorheim, 1975).

Data on the distribution of recent earthquakes and the map of seismic risk zones in the United States indicate that the probability of significant earthquakes or tremors in the study area is relatively small (Spencer, 1972; Cargo and Mallory, 1974). There are no known fault zones in the area along which tremors are particularly likely to develop.

Environmental Impact of Facility Plans in Outlying Areas

Introduction

This section of the report summarizes the environmental impact of proposed facility plans for each community for which it was found not cost-

effective to include in an areawide treatment system. The primary reason for excluding them from an areawide system was the required transport distance.

Assessing the overall impact of a given facility plan on water quality in rural areas is made particularly difficult because (1) baseline data on upstream water quality in small, rural streams is generally not available; (2) the impact of non-point sources of nutrients, BOD, suspended solids and bacteria from agricultural land areas is highly variable with rainfall, season of the year and agricultural management methods; (3) the impact of effluent from existing treatment lagoons and from septic tank seepage beds also varies considerably throughout the year - impact is generally not sought or recognized except in extreme cases where gray, heavily contaminated seepage is evident at the surface of waterways or saturated soils; and (4) the efficiency of lagoon treatment systems is reduced during cold weather, when the organic load is highly variable or when the water level in the lagoon is poorly controlled.

All proposed plans for outlying communities have certain positive environmental effects in common. By eliminating septic tanks, undersized lagoons or poorly functioning mechanical plants, the proposed plans would (1) improve public health aspects of each community by reducing the chance of transmitting pathogens from waste systems to water sources and places of human contact; (2) increase property values by eliminating waste disposal problems or questionable situations; (3) increase opportunities for additional housing in the community.

All communities confronting the change from septic tanks to a collection system face two major problems in common - the high capital cost and the community disruption caused by installing the pipes.

In all cases where new or expanded lagoons are proposed, the lagoons would be built at elevations higher than that reached by the 100-year flood

level of rivers and streams and the flood pool elevation of Lake Red Rock in the case of communities in the southeastern portion of the study area. Necessary precautions would also be taken to minimize erosion of the inner and outer walls of the lagoon, that muskrats would be prevented from burrowing in the lagoon walls, that the lagoon would be enclosed by fencing to prevent access by young children, and that mosquito populations would be controlled as needed during summer months.

All loss of flood retention capacity caused by construction in the Lake Red Rock flood pool area must be compensated by an equal volume of newly created flood capacity. This flood control requirement will apply in the facilities proposed for Runnells, Hartford and Carlisle.

Alleman

Proposed Plan: Abandon septic tanks; build collection system and treatment lagoon.

Impact on Water Resources. Alleman is located near the south edge of a glacial channel of the Skunk River. A buried aquifer (extending to over 200 feet below the surface in some locations) now lies along this channel. To minimize any potential threat to the water quality of the buried aquifer by contaminated seepage, the lagoon should be located as far south of the village as practicable. (The proposed site is one-fourth of a mile south of Alleman.)

Effluent from the lagoon would be discharged twice annually to Fourmile Creek under high stream flow conditions. The lagoon effluent would be much higher in quality than the present discharge from collected septic tank outfalls; therefore the overall quality on Fourmile Creek would be substantial improvement in water quality.

Impact on Air Resources. No significant impact foreseen.

Impact on Land Resources. Approximately seven acres of agricultural land would be required for the treatment lagoon and supporting land area. Necessary additions to the existing collection system would cause short-term, local disruption of land corridors in the town and leading south to the new lagoon site.

Impact on Biological Resources. The treatment lagoon would drastically reduce the pollution loadings now discharged to Fourmile Creek and thereby significantly improve conditions for aquatic animals, including a beaver colony downstream of the present discharge point.

Impact on Environmentally Sensitive Areas. No significant impact foreseen.

Impact on Socio-economic and Cultural Resources. There would be a significantly enhanced sense of security provided by eliminating the polluted discharge to Fourmile Creek and thereby improving its water quality. Recreational value of the Creek would be restored.

The cost of making these improvements would be disproportionate to the available financial resources of the community and private customers served. Therefore, additional funding sources would be required to implement the proposed plans.

Impact on Aesthetic Features. There would be occasional odor generated in the vicinity of the treatment lagoon. Elimination of polluted discharge to Fourmile Creek would increase the aesthetic value of the Creek.

Carlisle

Proposed Plan: Expand existing lagoon.

Impact on Water Resources. The existing treatment lagoon is in the flood pool area of Lake Red Rock. It overlies alluvial aquifers of the Des Moines River, and it discharges to the North River, a tributary of the Des Moines. Expanding the lagoon would decrease the probability of contaminating one or more of the water resources named, but the probability would not be eliminated altogether. The most important impact of this plan would be that wastewater could be retained for longer periods of time during which the lagoon is operating at reduced efficiency (winter months), thereby greatly reducing the discharge of poorly treated wastewater. The proposed plan calls for discharge twice annually (during high flow stream conditions), which provides the minimum practical impact on the water quality of North River.

Impact on Air Resources. No significant impact foreseen.

Impact on Land Resources. An additional 13 acres of flood-prone farmland would be required in addition to the 35 acres now used for lagoons.

Impact on Biological Resources. Upgrading the lagoon would improve conditions for aquatic animals in the North River. Discharging treated effluent only twice yearly under high flow conditions on the receiving stream would greatly improve habitat quality.

Impact on Environmentally Sensitive Areas. The land surrounding the present and proposed future lagoons is flood prone by virtue of being in the flood pool area of Lake Red Rock. This means that under wet weather of flood conditions, the water table could rise close to or perhaps even above the level reached by the zone of saturation formed by the lagoon. The potential contaminated seepage joining groundwater can be reduced but not eliminated altogether under these conditions.

Impact on Socio-economic and Cultural Resources. There would be an enhanced sense of security provided by more adequate wastewater retention capacity during cold weather and the resulting improvement in water quality.

The cost of the improvements proposed here would be relatively low, approximately \$40 per household per year. This is well below a reasonable maximum of one-half of one percent of annual income for sewage treatment expenditures.

The area in the vicinity of the existing lagoon may contain significant archaeological resources, therefore more site-specific investigations would be required prior to the development of any detailed plans.

Impact on Aesthetic Features. Doubling the present lagoon area would detract visually from the natural landscape value in the area east of Carlisle.

Occasional odor problems would continue in the vicinity of the treatment lagoons.

Cumming

Proposed Plan: Abandon septic tanks; build collection system and lagoon.

Impact on Water Resources. Lagoon effluent discharge to the receiving stream (a tributary to North River) twice yearly would cause minor increases in suspended solids, BOD nutrients in the receiving stream. The overall impact of the effluent on North River would be very small.

Impact on Air Resources. No significant impact foreseen.

Impact on Land Resources. Approximately six acres of farmland would be required for construction of the lagoon and supporting land area. Additional land corridors would be disrupted temporarily as the collection system is constructed.

Impact on Biological Resources. No significant impact foreseen.

Impact on Environmentally Sensitive Areas. No significant impact foreseen.

Impact on Socio-economic and Cultural Resources. The cost of making these improvements would be disproportionate to the available financial resources of the community and private customers served. Therefore, additional funding sources would be required to implement the proposed plans.

Impact on Aesthetic Features. There would be occasional odor in the vicinity of the lagoon.

Elkhart

Proposed Plan: Expand existing lagoon.

Impact on Water Resources. Expanding the treatment lagoon would significantly increase the quality of the effluent discharged to South Skunk River. The most significant aspect of this improvement would be that wastewater flows could be retained during winter months, when treatment efficiency in the lagoon is very low, and during low flow conditions in the receiving stream.

Impact on Air Resources. No significant impact foreseen.

Impact on Land Resources. Approximately two acres of farmland would be required in addition to the 3.1 now in use for the lagoon.

Impact on Biological Resources. A decrease in BOD of the lagoon effluent would greatly improve conditions for aquatic animals in South Skunk River.

Impact on Environmentally Sensitive Areas. The present lagoon site is close to the southwestern edge of the buried aquifer formed by a pre-glacial channel of the Skunk River, although the threat to its water quality from seepage is small due to the glacial overburden protecting it.

Impact on Socio-economic and Cultural Resources. There would be an enhanced sense of security provided by the improved quality of treated effluent discharged to South Skunk River.

The cost of making these improvements would be disproportionate to the available financial resources of the community and private customers served. Therefore, additional funding sources would be required to implement the proposed plans.

Impact on Aesthetic Features. No significant impact foreseen.

Granger

Proposed Plan: Expand existing lagoon.

Impact on Water Resources. The existing lagoon system lies over the alluvial aquifer associated with Beaver Creek and borders on its floodplain. Expansion of the lagoon system into or along the floodplain would increase the hazard of contaminated seepage penetrating the aquifer.

Treated lagoon effluent is now discharged to Beaver Creek. Upgrading the lagoon system would allow more efficient treatment and retention during cold-weather periods and periods of low flow in the receiving stream. Twice yearly discharge is proposed.

Impact on Air Resources. No significant impact foreseen.

Impact on Land Resources. Upgrading the lagoon would require approximately 13 acres in addition to the six now used.

Impact on Biological Resources. (See "Environmentally Sensitive Areas" below.)

Impact on Environmentally Sensitive Areas. The existing lagoon is located just upstream from one of the few wetland sites in the study area. It is a shallow depression in the landscape extending for nearly two miles along the Beaver Creek. Brenton Slough is located in the southeast portion of this wetland complex.

The wetland contains an abundance of emergent vegetation, which provides cover and food sources for ducks and other birds as well as small mammals. As a shallow water system, it is particularly sensitive to changes in surface and near-surface ground water quality.

Expanding the lagoon into or along the floodplain would increase the hazard of ground water contamination and therefore the hazard to the wetland system as a whole. Special precautions during construction and periodic inspections for leaks or faults in the lagoon system are required to minimize hazard to the slough.

Impact on Socio-economic and Cultural Resources. The wetland system provides recreation for persons interested in hunting and wildlife in general.

Upgrading the lagoon system would also enhance the sense of security provided by improved water treatment.

The cost of proposed improvements would be approximately \$105 per household per year.

Impact on Aesthetic Features. Occasional odor would be generated in the vicinity of the treatment system.

Grimes

Proposed Plan: Improve existing mechanical plant.

Impact on Water Resources. Effluent discharge to Walnut Creek would take place only during high stream flow conditions. The net impact of this plan would be to improve water quality in Walnut Creek.

Impact on Air Resources. No significant impact foreseen.

Impact on Land Resources. The land area now used for the treatment facility would be increased by two to five acres.

Impact on Biological Resources. Improving effluent discharge would contribute to improved conditions for aquatic animals in Walnut Creek.

Impact on Environmentally Sensitive Areas. No significant impact foreseen.

Impact on Socio-economic and Cultural Resources. There would be an enhanced sense of security provided by cleaner water.

The cost of proposed improvements would be approximately \$100 per household per year.

Impact on Aesthetic Features. No significant impact foreseen.

Hartford

Proposed Plan: Abandon septic tanks; build collection system and lagoon.

Impact on Water Resources. The lagoon effluent would be discharged twice yearly to Butcher Creek, the lower reaches of which are located in the flood pool of Lake Red Rock. This discharge may contain elevated levels of suspended solids, BOD and nutrients in relation to those levels in the receiving stream, and thereby cause a small decrease in the quality of a downstream portion of the stream. However, discharge during high flow conditions would minimize any negative water quality impact.

Impact on Air Resources. No significant impact foreseen.

Impact on Land Resources. Approximately 16 acres of farmland would be used for the lagoon and supporting areas. Construction of the collection system would temporarily disrupt additional land corridors throughout the service area.

Impact on Biological Resources. The lagoon effluent is likely to have a nutrient level which may be greater than that of the receiving stream. However, only twice yearly discharge from the lagoon is proposed; therefore, the impact of the effluent, if well treated, would be trivial.

Impact on Environmentally Sensitive Areas. No significant impact foreseen.

Impact on Socio-economic and Cultural Resources. The cost of making these improvements would be disproportionate to the available financial resources of the community and private customers served. Therefore, additional funding sources would be required to implement the proposed plans.

Impact on Aesthetic Features. The land area used for the lagoon system would be degraded visually by the structure. Occasional odor would be generated in the vicinity of the lagoon system.

Mitchellville

Proposed Plan: Abandon existing plant; construct interceptor to new lagoon downstream on Camp Creek.

Impact on Water Resources. Discharging higher quality effluent to East Branch Camp Creek further downstream than at present would substantially improve the water quality of the stream. Discharge will take place only during high flow stream conditions when the effluent water quality meets the prescribed limits.

Impact on Air Resources. No significant impact foreseen.

Impact on Land Resources Approximately 15 acres would be required for the lagoon. All available land in the vicinity is farmland.

Construction of the interceptor would temporarily disrupt a corridor of approximately 1,500 feet.

Impact on Biological Resources. The improved water quality would result in a small but significant decrease in conditions for aquatic plant growth and a similar increase in conditions for aquatic animals.

Impact on Environmentally Sensitive Areas. No significant impact foreseen.

Impact on Socio-economic and Cultural Resources. The Thomas Mitchell County Park begins approximately one mile downstream of the proposed facility. The impact of the proposed facility would be to reduce the public health hazard in the Park by improving the water quality of Camp Creek.

The cost of the project would be approximately \$75 per household per year.

Impact on Aesthetic Features. No significant impact foreseen.

Norwalk

Proposed Plan: Expand existing lagoon.

Impact on Water Resources. The existing lagoon discharges to the North River. Expanding the lagoon would improve the quality of its effluent and thereby improve the quality water in a downstream portion of the North River. Discharge would take place only twice yearly - during high stream flow conditions.

Impact on Air Resources. No significant impact foreseen.

Impact on Land Resources. Approximately 15 acres are now used for the lagoon. An additional 42 acres would be required to fully upgrade it. Most of the land available for expansion is farmland. Expanding the lagoon system to the south or southeast would destroy valuable protective vegetation bordering the North River.

Impact on Biological Resources. Conditions for aquatic animals in the North River would be improved by upgrading the existing lagoon system and by retaining treated wastewater during low flow conditions.

Impact on Environmentally Sensitive Areas. No significant impact foreseen.

Impact on Socio-economic and Cultural Resources. There would be an enhanced sense of security provided by cleaner discharge to the North River and by a facility that could adequately accommodate the projected growth of the community.

The cost of the proposed improvements would be approximately \$43 per household per year.

Impact on Aesthetic Features. A threefold increase in lagoon area would visually degrade the landscape along the North River. Occasional odor would persist in the vicinity of the treatment system.

Polk City

Proposed Plan: Expand existing lagoon.

Impact on Water Resources. Twice yearly discharge to the Big Creek would be improved substantially, and this would cause an improvement in the overall water quality of the stream by eliminating discharge during low flow conditions.

Impact on Air Resources. No significant impact foreseen.

Impact on Land Resources. Approximately 17 acres would be required in addition to the eight now used for the lagoon. All available land (excluding some steep slopes) is farmland.

Impact on Biological Resources. Conditions for aquatic animals in Big Creek would be improved greatly by controlled discharge and by improved wastewater treatment.

Impact on Environmentally Sensitive Areas. Expansion of the lagoon system to or near the steep slopes could cause surface seepage and/or slope failure.

Impact on Socio-economic and Cultural Resources. Improving the quality of water treatment would enhance the value of Big Creek as a local recreational resource. The cost of improvements would be about \$72 per household per year.

Impact on Aesthetic Features. No significant impact foreseen.

Spring Hill

Proposed Plan: Abandon septic tanks; build collection system and lagoon.

Impact on Water Resources. Treated effluent would be discharged to Middle River, 16 miles above its confluence with the Des Moines River, but the threat to its water quality is small because of Spring Hill's population in relation to the total discharge of Middle River and because no discharge would be made during low flow conditions.

The lagoon would be located over an alluvial aquifer lining the River, therefore, seepage would be a hazard without special protective measures.

Impact on Air Resources. No significant impact foreseen.

Impact on Land Resources. Approximately three acres of land would be required for the lagoon and supporting land area. Additional land corridors would be temporarily disrupted in connection with the construction of the collection system.

Impact on Biological Resources. No significant impact foreseen.

Impact on Environmentally Sensitive Areas. No significant impact foreseen.

Impact on Socio-economic and Cultural Resources. The cost of making these improvements would be disproportionate to the available resources of the community and private customers served. Therefore, additional funding sources would be required to implement the proposed plans.

Impact on Aesthetic Features. Occasional odor would be generated in the vicinity of the lagoon.

Waukee

Proposed Plan: Expand existing lagoon.

Impact on Water Resources. Lagoon effluent would be discharged to the Upper Sugar Creek, thereby posing an ongoing, small hazard to its water quality, primarily during low flow conditons in the stream and/or during times of reduced treatment efficiency in the lagoon.

Upgrading the lagoon would improve the quality of its effluent and decrease the overall hazard to the water quality of Upper Sugar Creek.

Impact on Air Resources. No significant impact foreseen.

Impact on Land Resources. Approximately 45 acres would be required in addition to the eight acres now in use by the existing lagoon. All available land is farmland.

Impact on Biological Resources. With an overall improvement in the quality of treated effluent, conditions for aquatic plants would decrease slightly and conditions for aquatic animals should improve slightly.

Impact on Environmentally Sensitive Areas. No significant impact foreseen.

Impact on Socio-economic and Cultural Resources. There would be an enhanced sense of security provided by improved water quality in Sugar Creek.

The cost of the proposed improvements would be approximately \$41 per household per year.

Impact on Aesthetic Features. No significant impact foreseen.

Energy Requirements

The major energy-demanding activities required to implement the proposed plan are electrical energy to operate the lift stations in the collection system (approximately 130,000 kilowatt-hours per year); electrical energy to operate pumps and control equipment in the areawide treatment plant (approximately 17 million kilowatt-hours per year); approximately 30,000 gallons of fuel (probably diesel fuel) to operate sludge-hauling trucks; and approximately 130,000 gallons of fuel oil or its equivalent to heat buildings associated with the areawide treatment facility.

Impact on Historic/Archaeologic Sites

The 208 Study committee is coordinating review of the potential impacts of proposed projects on cultural resources with the Division of Historic Preservation (DHP), State Historical Department.

When specific project sites are identified, they will be reviewed by the Division. Recommendations made by DHP concerning potential impacts of the proposed projects, i.e., surveys, intensive investigations, and procedures for mitigating adverse impacts, will be given consideration and will be implemented as early as possible in project planning.

Evidence currently available indicates that the Des Moines River Valley was rather intensively occupied (Gradwohl, 1974). It may be possible to identify materials indicating cultures as early as 5,000-10,000 years B.C. There is a considerable amount of material associated with cultures dating

from around the first century A.D. When all of the sites now identified are thoroughly studied and catalogued, it should be possible to derive important ecological, cultural-historical, and ethnographic conclusions about early occupants of this region.

Nearly all of the sites presently identified are within approximately two miles on either side of the Des Moines River. Many sites have already been covered by the Red Rock Reservoir or will be covered by the Saylorville Reservoir. One known site is on the south side of Walnut Creek in the southwest portion of the study area.

The distribution of known archaeological sites is, of course, strongly biased toward the projected flood areas of the Saylorville, Big Creek and Red Rock Reservoirs. Therefore, it is impossible to say that other areas, particularly along the Des Moines River, do not contain significant archaeological sites.

It is the policy of the Division of Historic Preservation, State of Iowa, not to disclose the location of individual sites, but rather to disclose general areas where such sites exist. For this reason, only general areas have been identified, and specific sites would have to be investigated during Step 1 portions of construction projects.

Economic Impact

The 208 plan and program for the improvement of water quality in the Des Moines area is designed to serve the area through the year 2000. To appraise the economic impact of a plan, which is to be flexible and which is subject to many modifications, on a community, which is heterogeneous in character and then dynamic and changing, necessarily involves a number of assumptions if it is not to become so complex as to be meaningless. The plan consists of a number of interrelated elements which must be considered in

total even though put together as separate elements. These include the Land Use Intensity Plan showing the arrangement of the community with a population of 400,000 in the year 2000, the plans for reduction of point, intermittent and non-point sources of pollution some of which, such as trunk sewers and treatment facilities, are quite definite and specific and others of which, such as regulatory systems for erosion control, may be of uncertain effectiveness. Finally the plan includes a management program showing the administrative arrangements, the legal measures, and the financing required to carry out its recommendations.

It is all of these that make up the 208 plan and program and it is the economic impact of all of them that is being estimated.

For convenience, in many cases, it is the average situation and the average population (i.e., that for 1990) that is measured. These measurements must be related to the economic baseline projections incorporated into the 208 program. Cost estimates for the 208 program are in 1976 dollars. Economic projects included herein to be consistent are also in terms of 1976 dollars. No attempt has been made to anticipate the extent of continued inflation.

Economic Baseline Projections

The population of the 208 area was estimated to be 315,000 in 1975 and to increase to 325,000 in 1980, 367,500 in 1990, and 400,000 in the year 2000. This estimate is predicated on an increase in employment from 142,000 to 180,500 over this 25-year period. (See Table II-11.)

Economy Generally

The Des Moines economy is noted for its diversity and for the steadiness of its growth - 1.5 percent per year for the period 1940 to 1970.

The community is a government center (the state capital), has a wide-ranging industrial base, serves as a retail and cultural center for virtually the entire State of Iowa, has a major complex of insurance and finance corporations, and is surrounded by some of the most productive farm land in the world. "Survey of Buying Power" in its 1976 edition (Sales and Marketing Management, 1976) estimated that Des Moines was the 42nd most affluent market among U.S. metropolitan areas in 1975 and that its ranking would be even more favorable in 1980, rising to 23rd! This was based on estimates of effective buying power per household.

The employment forecast indicated that manufacturing would not have a significant growth over the next 25 years, a growth of 14 percent, from 26,000 to 29,700. Employment in transportation and utilities would hardly change at all and there would not be much change in construction employment, i.e., from 6,700 to 7,900, a growth of 18 percent.

However, employment increases in the other four categories would be substantial:

Retail and wholesale trade	27 percent
Finance, Insurance, Real Estate	32 percent
Services and Miscellaneous	50 percent
Government	26 percent

It is clear from these estimates that the economic character of the community is changing. It is becoming less of a manufacturing center and much more of a financial service, trade and government center. These trends inject an even greater measure of stability into the economy.

Income

In 1967 the Offices of Business Economics and Economic Research Service of the Department of Commerce (OBERs) made projections of

population and family income for the United States and its major political subdivisions. These estimates when expressed in terms of 1976 dollars indicated Des Moines Metropolitan Area per capita income at -

\$6,600 for 1970
\$9,000 for 1980
\$11,500 for 1990, and
\$15,000 for 2000.

Applying these per capita estimates to population estimates results in total income for the 208 area of -

\$2,520,000,000 in 1976
\$3,051,000,000 in 1980
\$4,255,000,000 in 1990, and
\$6,000,000,000 in 2000.

Family Income

Because of decreases in births and changes in life styles, the average family size has been decreasing. This makes the number of households grow more rapidly than total population. In the Des Moines Metropolitan Area, the average number of persons per family decreased from 3.10 in 1960 to 2.98 in 1976. It is likely that this decrease will continue and it is estimated to be -

2.86 in 1980
2.75 in 1990, and
2.67 in 2000.

By multiplying projected per capita income by the respective projected family sizes, one obtains an estimate of family income as follows:

\$19,200 in 1976
\$25,700 in 1980
\$31,600 in 1990, and
\$40,000 in 2000.

The total disposable income ("Effective Buying Income") in the Des Moines metropolitan area for 1975 was estimated as being approximately \$16,300 per household (1976 Survey of Buying Power, 1976). The 1980 projection of disposable income made by the same group is \$23,770 per household.

Distribution of total income among families is quite uneven. If improvement of water quality is financed by user charges, poor families who use as much water as rich families must pay a considerably higher percentage of their income. The most recent data on family income (1969) showed that 45 percent of Des Moines area families had incomes under \$10,000 for that year; 32 percent between \$10,000 and \$15,000; and 19 percent between \$15,000 and \$25,000.

Wastewater Treatment Expenditures

While no hard and fast rule may be involved to determine a reasonable level of expenditures for wastewater treatment or for improvement of water quality, some guidance may be obtained by examining past levels of expenditure.

The Des Moines Metropolitan Area may be compared with seven other middle west metropolitan areas (see Table V-1) for the 1971-1972 fiscal year. The Des Moines area total sewerage expenditure per capita was \$13.49 the mean of the eight cities was \$18.35. Des Moines expenditures were 0.28 percent of gross personal income in comparison with an average of 0.43 percent for the eight metropolitan areas. This study indicates that 0.50

Table V-1

**PERCENT OF PERSONAL INCOME SPENT ON SEWAGE TREATMENT
1970-1971**

**Des Moines and Seven Other Midwest
Metropolitan Areas**

<u>Area</u>	<u>Total Per Capita Sewerage Expenditure</u>	<u>Per Capita Income</u>	<u>Sewerage as a Percent of Income</u>
Des Moines	\$13.49	\$4,747	0.28
Omaha	21.89	4,367	0.50
Peoria	6.04	4,821	0.13
Madison	25.85	4,497	0.57
Appleton	20.38	3,980	0.51
Duluth-Superior	15.77	3,834	0.41
Evansville	15.51	4,036	0.38
Fort Wayne	23.02	4,550	0.50
Mean	18.35	4,354	0.42

Sewage expenditures from U.S. Census of Governments, Local Government in Metropolitan Area, Vol. 5, Table 12.

Per Capita Income derived from Area Economic Projections, 1990, U.S. Department of Commerce. Income derived from 1967 dollars.

percent of personal income may be a reasonable upper limit of an acceptable expenditure for sewage treatment. While the "metropolitan area" (SMSA) and "208 area" are not coterminous, SMSA data comes closest to indicating conditions in the 208 area.

In 1976, in the 208 area, 285,000 persons were served by municipal sewerage facilities having a present worth of approximately \$105 per capita. Capitalized at 20 years at six percent interest, this represented an annual cost of \$8.50 per capita. Operation and maintenance costs were \$3,442,000 or \$12.08 per capita, making a total of \$20.58. This was 0.26 percent of the estimated 1976 per capita income. Approximately 104 persons were employed in sewage treatment in 1975.

General Impact of Water Quality on Economy

"Clean Water" is an important element in the environment and to eliminate most water pollution will improve living conditions. With industries and business enterprises (such as insurance companies) having a wide range of choice as to location, clean water would give the community a competitive edge in this economic competition. The secondary impact in enhancing water recreation opportunities would be of equal importance.

A similar result would come from the ability of the area to organize and coordinate 26 units of local government toward a common purpose. This could not help but be an attraction also.

One of the greatest difficulties in industrial operation stems from uncertainty concerning governmental actions. If an industry can be certain of the requirements that are to be placed upon it in regard to water quality, what it will need to do and what it will cost for example, it is better able to plan its operations and their financing. A reliable program for water quality improvement consistently carried out would provide an important factor of certainty for industrial operations.

Financial Aspects of the Plan

Economic impact of the 208 program will result from its costs and its benefits and these in turn will vary in their effects depending upon the means used to finance the program.

Financing Mechanisms Generally. Three general methods are utilized in financing wastewater management. These are:

1. Financing the wastewater treatment and management by the utilization of conventional taxation.
2. Imposition of fees such as building permits or, particularly, connection fees. By making a fee for connection of a new building to a sanitary sewer sufficiently high, the new building may be required to pay its proportionate share of previous investments in the system.
3. User charges. Wastewater collection and treatment may be looked upon the same way as any other utility and charges made to each individual user or discharger based upon the volume of waste that he contributes.

User charges may have many variations. The Environmental Protection Agency has regulations concerning these where there is Federal funding of the system. EPA regulations forbid the lowering of rates (decreasing step-rates) for the larger water users but demand that the rates be imposed on a per-gallon formula. Sometimes user rates are varied to take into account the quality of the wastewater going into the system (amount of treatment needed) or to take into account the distance that the wastewater has to be transported from its source to the treatment plant. It is also possible to use several types of user charges such as a flat charge for administration and

then a per-gallon charge for operation and maintenance, for treatment and for capital expenditures.

A "fourth method", which may or may not be available in the future, is to seek Federal and State construction grants for financing of capital improvements through EPA. Where these are available they can finance 80 percent of the cost of the improvement (75 percent Federal, five percent State). Applications are submitted to the Environmental Protection Agency which distributes funds (available partly at least from federal taxes collected locally) appropriated by Congress on a nation-wide basis. Distribution within Iowa is determined by a priority system administered by the State Department of Environmental Quality. These funds have played a very important part in recent construction. Some improvements may be financed by loans and grants from the Farmers' Home Administration for smaller communities or from grants from the Community Development Program of the Housing and Urban Development Department.

Capital costs of building a system may also be financed by a number of local methods. One of these, of course, is to impose additional taxes, fees or charges and to finance capital improvements on a "pay-as-you-go" plan. A second method is to issue general obligation bonds and to retire these bonds from a tax against either the entire community or against a special district benefiting from the particular improvement. Special assessments are frequently used for the laterals and collector elements in a sanitary sewer system. A final method of financing the improvements is through issuing revenue bonds. Where revenue bonds are used, the user charges must be sufficient to pay for the administrative, operation and maintenance costs of the agency and for the amortization of the bond issue itself. Bond ordinances may require that reserve funds be established to make the bond issue more attractive. Finally the bond "coverage" for the amount of income pledged to the bond issue should be 1.2 to 1.5 times the annual amortization costs of the bond issue.

General obligation bonds which are backed up by a real estate tax may be issued for a lower interest rate (sometimes one-half of one percentage point less) than the revenue bonds. Over a 20-year bond-issue period, utilization of the general obligation bond results in a rather considerable saving of interest costs. A particularly desirable financing method is to issue general obligation bonds at the lower interest rate and then to utilize the user charges to retire them.

At the same time, user charges are not deductible from personal income taxes. These charges are deductible from commercial and industrial taxes because they are a business expense. The average income tax is 17 percent. Assuming an annual per capita cost of \$25.00 for wastewater purposes with 40 percent or \$10.00 for capital improvements, the 80 percent federal and state grant would "save" \$8.00 while the tax saving that would result from a real estate tax rather than a user charge would be \$4.25. Thus utilization of the EPA and DEQ grants and the imposition of the user charges would be very much to the advantage of the taxpayer.

Estimated Costs

Point Source construction costs for the ICA (Integrated Community Area) are estimated at \$112,114,000 for Alternate Plan VIII - the chosen plan. Point source costs for the 13 outlying communities total \$4,120,000 but each outlying community is to be considered individually. Of the ICA point-source construction costs, \$84,100,000 would be financed by an EPA grant and approximately \$5,600,000 by a DEQ grant leaving \$22,423,000 to be financed locally. Annual operation and maintenance for trunk sewers and sewage treatment would be \$5,341,000 and for the lateral sanitary collection system \$1,327,000, a total of \$6,668,000. In addition the present indebtedness incurred by the communities in the ICA is \$9,884,000. Adjustment would also be made for industrial cost recovery charges. Thus the annual cost would be:

Point source construction (revenue bonds)	\$ 2,825,000
Point source operation and maintenance	6,668,000
Annual cost assumption of present debt	890,000
Adjust for industrial cost recovery	- <u>71,000</u>
	\$10,312,000

Intermittent source pollution mitigation measures would include segregating the sanitary flow from northwest Des Moines, Camp Dodge, Lovington, Urbandale-Beaver Creek, Johnston, Saylor Township and West Ankeny by routing the flow through a new interceptor sewer (force main) to be constructed parallel to the Westside Interceptor which presently received flow from combined sewers. Flow from the combined system would enter the main outfall to the treatment plant up to a point where the dilution ratio is five to one. Flows in excess of five to one would be diverted to the combined sewers with flow separators constructed at each of the combined sewer overflows and at strategic storm sewer discharges. Total construction cost for this program is \$3,487,000. Operation and maintenance is estimated at \$56,000 per year and total annual costs at \$385,000 per year.

Non-point pollution source mitigation proposed would include:

1. Promotion of cropland runoff control options;
2. Construction site erosion controls; and
3. Reductions in urban development in unincorporated areas.

Within the 208 area cropland runoff control expenditures are about \$125,000 per year. The program calls for an increase of \$1,000,000 per year, half of which would be provided by the state and federal governments and half by the individual farmers participating in the program.

Construction site erosion controls are estimated to add \$250,000 annually to the cost of construction in the Des Moines 208 area. Administration and enforcement would be carried out by existing personnel as would the program to reduce urban development in unincorporated areas.

Cost Per Capita

The estimated cost of the 208 program on a per-capita or per-family basis will vary in different parts of the 208 area. These costs should not be confused with user charges which may be considerably reduced by the commercial and industrial cost-sharing corrections.

For the integrated community area, annual costs (exclusive of the non-point program total \$9,127,000 per year), the 1990 (average) ICA population is estimated at 331,700, the cost per capita per year would be \$45-50; the average cost per family would be \$130. The cost for wastewater treatment would be approximately \$1.00 per gallon.

For the outlying communities, the annual costs per capita and per family would be:

<u>Community</u>	<u>Annual Cost</u>	<u>1990 Population</u>	<u>Per Capita Cost</u>	<u>Per Family Cost</u>
Alleman	30,000	270	111	307
Carlisle	50,000	3,500	14	39
Cumming	23,000	260	88	244
Elkhart	16,000	325	49	135
Granter	42,000	1,100	38	105
Grimes	70,000	2,000	35	97
Hartford	77,000	700	110	304
Mitchellville	56,000	2,100	27	74
Norwalk	58,000	3,700	16	43
Polk City	30,000	1,080	28	77
Runnells	50,000	585	85	236
Spring Hill	22,000	150	147	405
Waukee	40,000	2,700	15	41

The wide disparity in these per capita costs makes financing of these systems by some of the communities most questionable. Annual costs shown are exclusive of state and federal grants.

Cost as a Percent of Income

Exclusive of the non-point program local costs of the 208 program for the ICA of \$45-50 per capita amount to 0.41 percent of total income.

In the following outlying communities the estimated per capita costs are disproportionate to income: Alleman, Cumming, Elkhart, Hartford, Runnells and Spring Hill. Financing of the program by these communities with each one "on its own" would be most difficult unless further assistance from state or federal grants would be obtained.

The outlying communities and the agricultural areas would assist in financing their part of the administrative, planning, coordination and priority setting activities. These costs are expected to amount to roughly \$300,000 per year. The assessed value of the 208 area is not known. The Polk County assessed value totals \$3,591,968,000. If financed by a real estate tax, the tax rate would be .00835 percent to raise the \$300,000 in administrative expenses based on Polk County assessed value alone. The assessed value of the unincorporated areas of Polk County is \$454,523,000; there are about 1,350 farms.* With an assessed value of \$200,000, the administrative cost of the 208 program per farm would amount to about \$16.70.

Employment Generated

The water quality improvement program is anticipated to have an employment of about 150 by 1990, or 0.6 percent of the public employment of 23,500 anticipated for the 208 area for that date.

* 1,374 in 1969 Census of Agriculture.

The total amount of construction anticipated in the 208 program is:

\$130,827,000	point sources ICA
6,057,000	point sources outlying communities
3,487,000	intermittent sources
5,000,000	construction erosion control
\$145,371,000	

This is an average of \$7,269,000 over a 20-year period. Based on a construction work year of 1,400 hours and the generation of 35,000 man hours of work for each \$1,000,000 of construction, the 208 construction program would result in the employment, on the average, of 182 persons. This is 2.4 percent of the estimated 1990 employment in the construction category.

The non-point program for the agricultural areas would require an increase in the number of persons skilled in soil conservation and management, but the exact number is not determined.

Summary

The 208 program would not involve a significantly increased level of expenditure for water quality purposes in the area or any great increase in employment in either administration or construction. Any economic impact is more likely to be found from a more detailed examination of the program.

Conclusions

General. There would be very little impact from increases in public employment resulting from the 208 program. However, federal financing of the construction program would support 130 of the 182 construction workers. With such "outside" financing, each of these would support at least an additional service employee and the resulting population increase thus

occurring would be an addition of about 700 persons, hardly a significant "impact".

Industry. The impact of the 208 program on industry can be significant because of the industrial cost recovery requirements of EPA. These necessitate arrangements that recover from industries their proportionate part of that part of the capital expenditures for waste treatment and collection facilities financed by EPA. These requirements are complex and their exact impact on an individual industry would require a long and detailed study. Industrial cost recovery is not required for any enterprises discharging only domestic wastes into the treatment facility. Nor are these charges made against direct discharging industries unless these connect to an EPA financed treatment facility.

Seven major industries discharge cooling water only. Ten industries discharge directly and nine of these could connect with the new treatment plant in which event industrial charges would be required. There are 20 industries discharging to the Des Moines main treatment plant that pay a special sewage charge today. Special surcharges are imposed when the sewage discharged is particularly strong in BOD or suspended solids. These 20 industries have a total employment of about 4,750, about 18.3 percent of the current industrial employment of 26,000. The total industrial payments to the City of Des Moines in 1976 were \$288,000. However, additional charges are being imposed in 1977 that will add \$306,000 making the total charge \$594,000.

The new wastewater treatment plant is estimated to cost \$47,890,000. New trunk sewers, equalization basins, pump stations, etc., are estimated to cost \$51,971,000, a total of \$99,861,000. The EPA grant is estimated at \$73,379,000. An industry would pay the usual user charge of about \$1.00 per 1000 gallons of water used. Then it would pay its part of the EPA grant for the treatment plant and the trunk sewers. With a recovery period of 25

years, the annual cost of the EPA grant would be \$293,516. With industry using four of the 50 mgd average flow of the plant, the annual cost recovery charge would be \$23,500. With the industrial discharges averaging three times the strength of domestic sewage, the total annual industrial cost recovery charge would be about \$70,500 per year. This would add about 7½¢ to the \$1.00 per 1000 gallon user charge for the average industrial user.

Much would depend, however, upon the waste characteristics of the individual industry's discharge. Eight food processing plants with a total employment of a little under 1000 would be likely candidates for pre-treatment. The precise impact could only be determined by a detailed analysis of each industry. It would not appear that industrial cost recovery charges would have an adverse effect on the competitive position of the Des Moines area for industry. Nor is it deemed likely that any existing industry, with possibly one exception, would move to another location because of the charges imposed by the 208 program.

Residential Users. Previous studies show the wide variation that exists in water and sewer charges made in the 208 area. (See Table III-2, Phase 2, Interim Report.) The 208 program would not change the water rates. However, for the ICA all sewer charges would be billed and collected through the water supply organizations. These charges would pay for the transport and treatment of the sewage. Remaining responsibilities for the lateral sewer systems and storm drainage would be financed by connection charges and conventional taxation or by additional user charges.

The average person is expected to use 65 gallons of water per day. At 2.75 persons per family, the average family use would be 65,000 gallons per year. At \$1.00 per 1000 gallons, the annual sewer charge would be \$65.00 per family. This would be 0.185 percent of the average family income in 1990.

A sewer charge is regressive in that it falls more heavily on the poorer families than on the wealthier. The \$65.00 per family charge is only 0.26

percent of the income of a family making \$25,000 per year while it is two and one-half times as high a percentage of the \$10,000 a year family. Unfortunately family income data is too far out of date to enable an analysis of these impacts. Studies in larger metropolitan areas have shown that per capita water use increases as family income increases although not in exact proportion. With the user charge on a per-gallon basis irrespective of the total quantity used, there will be a tendency for the charge vs. family income to even out somewhat although it is not possible to determine just how much.

Outlying Communities. The 208 area includes 13 outlying communities. Four have no sewer system at all. Four have estimated 1990 populations of less than 500, two of between 500 and 1,000 and only four more than 2000. Data on family income is lacking but the average family income in these communities is probably less than the average for the remainder of the 208 area. Assuming that the average income in these communities would be the same as the \$11,700 average for 1990 and that a reasonable maximum for sewerage expenditures is roughly one-half of one percent of income, then any program that costs more than \$58.50 per capita per year could not be self-financed. On this basis the following programs could be self-financed:

Carlisle	Norwalk
Granger	Polk City
Grimes	Mitchellville
Waukee	

The remainder would require additional Federal, State or local assistance.

Unincorporated Areas and Communities Without Collection Systems. There are nine communities, five incorporated and four unincorporated that have no collection systems at all. The unincorporated areas would have to be annexed or the counties would have to be given the power to build the

collection systems in the unincorporated areas. Financing of the collection systems would be by benefit assessments against the area served. Because of the characteristics of these areas, 10-year assessment bonds bearing an eight percent interest are assumed to be required. These collection systems are needed as soon as possible in order to eliminate the septic tank difficulties in these areas. Capital costs have been estimated. The result would be:

<u>Service Area</u>	<u>Cost</u>	<u>Annual Cost</u>	<u>1980 No. of Families</u>	<u>Annual Cost Per Family for 10 years</u>
Bloomfield Twp.	624,000	87,360	950	92
Cumming	147,100	20,595	76	271
Delaware Twp.	3,025,000	423,490	900	471
Hartford	592,500	82,950	220	377
Johnston	1,664,500	233,030	1,120	208
Lovington	405,750	56,805	420	135
Saylor Twp.	4,685,000	655,890	1,575	416
Spring Hill	166,400	23,295	50	466
W. Bloomfield Twp.	130,000	18,200	185	98

In most instances these charges would severely deteriorate the value of the area for residential purposes and would inhibit further residential construction within them. This program would thus have an impact on the general growth trends in the metropolitan area. It would have to be accompanied by stringent regulations of the use of septic tanks such as a minimum five or ten acre lot, otherwise the problem areas would just move to new locations.

Agriculture. As previously noted administrative, planning, priority and coordination activities of the AWA would cost the average farmer \$16.70 per year. A major element of the non-point program would be reduction in pollution from cropland runoff. This program would have a major impact on the agricultural areas.

The soil and water conservation programs, as administered by existing agricultural agencies, are reducing the effects of cropland runoff on the

water quality of streams and lakes. A program administered by the Soil Conservation Districts considers the use of all available conservation practices in an overall farm resource management program. For each farmer who agrees to become a SCD cooperator, SCD personnel develop alternate conservation systems to bring soil losses for the farm within tolerable limits. Each participating farmer then has the opportunity to select a system for implementation. In this way, to become eligible for funding, farmers must agree to become cooperators in whole with their respective Soil Conservation District.

If the control options considered in the 208 Program were implemented over the entire 208 Study Area, the waste loads transported from croplands to receiving surface waters would be reduced by at least 60 percent. Problems associated with complete implementation of conservation programs include the availability of sufficient funds for cost-sharing programs, a lack of land contractors to do all the needed land reshaping such as installing terraces, and need to follow several deviations from conventional farming practices which have been in existence for several decades. If these problems could be overcome, the trend towards the adoption of conservation farming practices may be increased. Such an increase would result in significant improvement in surface water quality within the 208 Study Area.

For the entire Study Area, approximately 180,000 acres of cropland should be terraced to reduce the pollutorial potential and to maintain the productive capacity of the associated land. Within Polk County there are presently 900 acres of cropland with tile outlet terraces and 3,200 acres of cropland with graded and parallel broad base terraces which will eventually be converted to tile outlet systems. Within the Dallas and Warren County sections of the Study Area, the number of acres presently terraced are also negligible as compared to the total number of acres which should be terraced. Most, if not all, of the terraces which will be constructed in the future will be tile outlet terraces.

Approximately 8,300 additional acres of terraced land will be constructed by the year 2000 under the existing programs. With the equivalent number of acres of tile outlet terraces presently being approximately 3,000 acres and assuming that approximately 8,000 acres of cropland which need terracing will be developed to urban IDP categories by the year 2000, a subsidy program would need to promote the construction of approximately 161,000 acres of terraces.

In addition to terraces, many grade stabilization structures need to be constructed within the Study Area for the stabilization of stream banks. Within Polk County, the existing 158 grade stabilization structures represent approximately one-third of those needed. Therefore, approximately 300 grade stabilization structures need to be built within Polk County. If this figure is extrapolated based upon cropland acreages, approximately 470 additional grade stabilization structures need to be built within the Study Area. By the year 2000, under existing programs, 125 additional grade stabilization structures will have been built. Therefore, the construction of approximately 350 grade stabilization structures would have to be promoted through a 208 program. If it is again assumed that a funding program will begin in 1978, approximately 15 grade stabilization structures would need to be built yearly, if all the needed structures are to be installed by the year 2000.

The 208 program contemplates a more than 10-fold increase in the soil conservation subsidy program to \$1,125,000 annually in the 208 area. This assumes 50 percent cost sharing, terracing to cost \$300/acre terraced, and grade stabilization structures to cost \$10,000/structure. The calculations are based upon a 23-year program which is to begin in 1978 and end in the year 2000. Seven thousand acres are to be terraced yearly or 161,000 acres by the year 2000, and 15 grade stabilization structures are to be built yearly or approximately 350 by the year 2000.

The cost of a subsidy program represents 50 percent of the construction cost. The other 50 percent of the construction cost must be provided by the property owners. In addition, the design cost incurred by SCS has not been accounted for in the 208 program. Certainly, additional manpower would be required by SCS to design terraces under a subsidized program. Manpower requirements may increase as much as twenty-fold.

There should be an economic incentive if farmers are to install terraces. The present construction cost to the farmer for terracing is \$150/acre. This present cost is equivalent to a 20-year uniform annual cost of approximately \$14/year at seven percent interest. Therefore, if the combined effects of reduced farming costs or increased yields can produce an additional \$14/acre/year for the farmer, there should be an economic incentive for the farmer to install terraces. There may be some maintenance costs associated with terraces; however, these are generally regarded to be very minor. The combined effects of decreased power costs due to contour farming, decreased fertilizer losses, moisture conservation, increased yields, and topsoil conservation provide such an economic incentive.

With the agricultural run-off program being voluntary, its true scale and scope will depend upon the participation of the individual farmer. He will determine its economic benefit as he will pay one-half the cost.

Summary. The economic impact of the 208 program appears limited primarily because of the extraordinary health of the general economy of the 208 area. The program itself would be well below the amount the area could afford to spend on water quality. Negative impacts would appear to be limited to:

1. A few industries (with a total employment of about 1000) affected by industrial cost recovery or by the necessity to install pre-treatment systems. The 208 program as such is not expected to

generate any removals or abandonment of such industries particularly when some of them (the dairies) are of a service nature.

2. Requirements for additional financing assistance for sewage systems for some outlying communities.
3. High costs of installing lateral sewers in certain unincorporated areas and outlying communities which again may require additional financing assistance.

Adverse economic impacts have been virtually eliminated by the proposed management plan and its proposed areawide wastewater agency and its areawide financing systems. If such a system is not used, financing by local governments no matter in what combination cannot help but interject economic variables that would help certain cities and hurt others and by so doing artificially change the relative positions of different parts of the 208 area for different purposes. The proposed management system which generally treats everyone alike will have an economic benefit.

Economic benefits from the 208 program include a superior environment and a certainty regarding long-range wastewater requirements that will assist in attracting new industry to the Des Moines area, at least to the extent previously predicted and perhaps to an even more rapid growth rate.

Social Impact

General

The economic impact study included projections of populations, families and individual and family income over the planning period. Anticipated changes in the age distribution of the population are also significant to the social impact. (See Table V-2.) Between 1970 and 2000 the 30 to 39 age

Table V-2

**ANTICIPATED CHANGES IN AGE GROUPINGS
OF POPULATION**

Des Moines, Iowa 208 Area

<u>Age Group</u>	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>2000</u>	<u>Percent Change 1970-2000</u>
0- 9	55,500	53,400	62,100	67,600	+21.8
10-19	58,100	55,900	51,800	56,300	- 3.1
20-29	45,800	59,500	55,500	60,400	+31.6
30-39	33,600	50,400	62,300	67,800	+102.0
40-49	35,000	34,000	50,100	54,500	+55.6
50-64	42,600	48,000	46,300	50,400	+18.4
65 and older	<u>29,400</u>	<u>34,300</u>	<u>39,400</u>	<u>43,000</u>	<u>+46.3</u>
total	300,000	335,500	367,500	400,000	+33.3

Projection is an adjustment and extension of those made for the Des Moines SMSA by Real Estate Research Corporation.

category is expected to more than double. The next highest increase would be in the 40 to 49 age category, a growth of 56 percent. There would be a significant increase in the elderly (46 percent) and a small decrease in the number of persons 10 to 19 years of age. These projections are relevant to estimates of persons per household, number and size of housing units required, etc.

Community Cohesion and Identity

The 208 area has an interesting organization. The population of 315,000 in 1975 is expected to increase to 400,000 by 2000, a growth of 85,000. The number of families would increase from 108,250 to 150,000.

Des Moines and the six immediately adjacent suburbs are expected to grow from 253,000 in 1975 to 293,000 in 2000, accommodating a little less than one-half the expected growth. In the more outlying parts of the 208 area, there are 13 "satellite" cities, separated from the central urban complex. These have been growing rapidly in recent years and, as a total, are expected to almost double in population by 2000, going from 33,500 to 65,700 and accommodating three-eighths of the new growth. This is expected for the following reasons. The small towns were originally service areas for the agricultural areas around them. They have an attractive "small town" character. Living in them is cheaper than living in the urban center. They have their own school systems. "Big-city" problems are gone. In order to keep the benefits of such an arrangement, the individual community identity needs to be preserved.

Other growth is anticipated for seven major unincorporated areas, to increase from 12,700 persons to 32,900 persons, and for the rural non-farm population, to increase from 7,500 to 11,800 persons. Basic difficulties result from both these trends. There are serious economic problems in providing

lateral sewers to the unincorporated areas. Further additional scattered rural non-farm development cannot help but displace agricultural land. Both trends are inimical to optimum development of the 208 area.

The facilities plan, however, imposes some adverse effects insofar as community identity is concerned. These are the result of the long trunk sewers that would connect Altoona and Bondurant with the central treatment plant, and two long trunk lines connecting to the two Ankeny treatment plants. These tend to partially destroy the identity of these three communities and serve extensive areas that should remain in agricultural use. These trunk sewers and the new trunk line south of the City of Des Moines that serves the Lakewood area will generate serious land use control problems if the Land Use Intensity Plan is to be maintained.

Public Participation

Effective public involvement in the water quality improvement program should be a result of the more decentralized management system. This will require the participation of the local public officials and is designed to generate more public interest by maintaining the maximum amount of community identity.

Housing Conditions

The 208 program would be a major element in the improvement of housing conditions.

Sewer Back-ups. The growth pattern of the Des Moines area in recent years has resulted in development of lands at fairly high intensity at the outer limits of watersheds. Sewer capacity has been "stretched" to accommodate this growth. Foundation and roof drains have found their way into sanitary sewers. The result has been sewer back-ups that plague rather large parts of

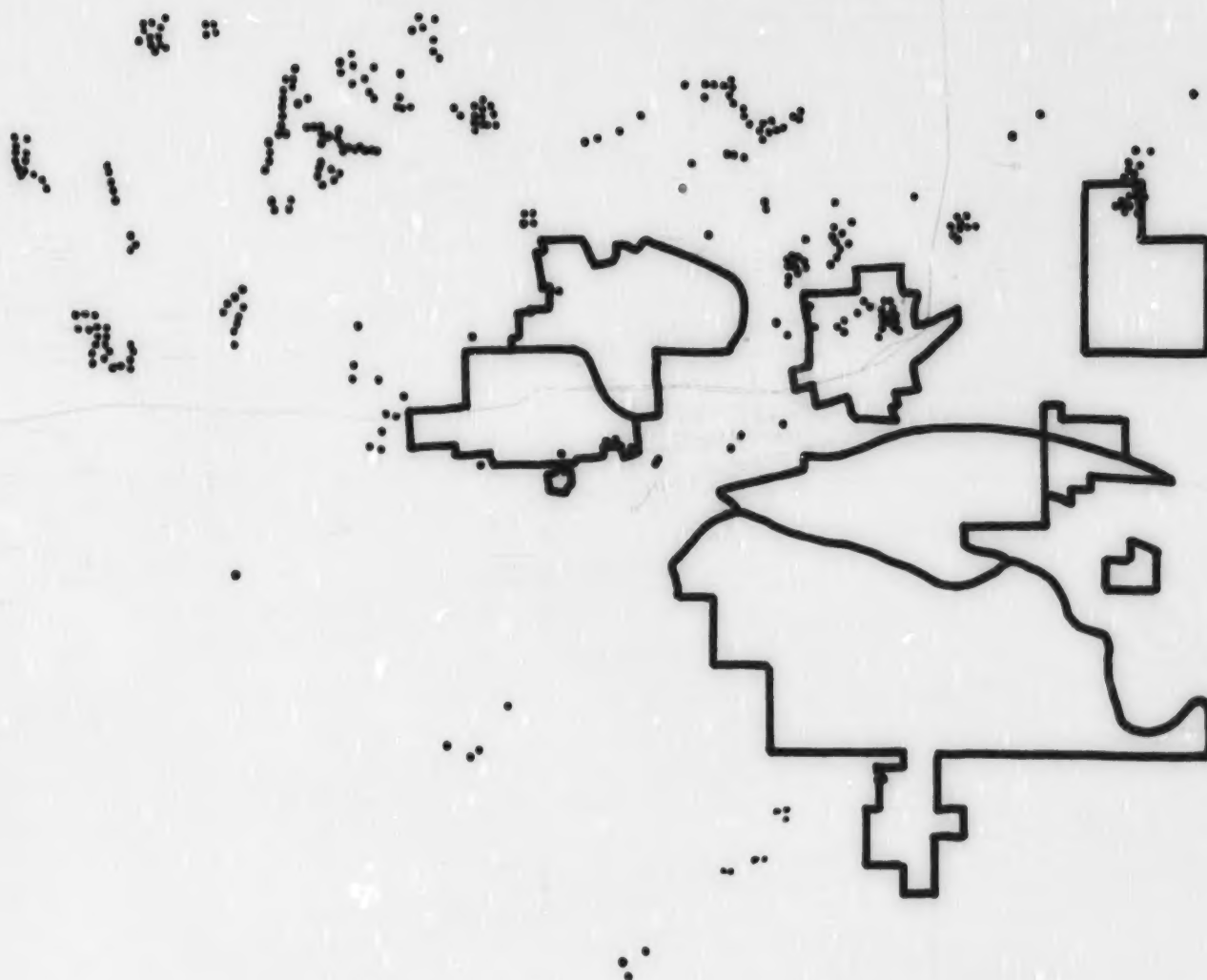
the urban area. These cause health hazards and loss of confidence in the neighborhood. (See Plate V-2.) Many of the sewer back-up areas correspond with areas occupied by the lower income groups.

The 208 program proposes construction of 13 "equalization basins" at a cost of \$10,000,000. These basins would relieve the overloaded sewers at critical times and eliminate the basement back-up problem. A program to remove foundation and roof drains and to lessen water use would be of assistance also.

Foundation and Roof Drains. The only practical solution to removing foundation and roof drain flows from the sanitary sewers is by ordinance and/or by making a separate charge for those that discharge to the sanitary collection system. Such charges (for existing buildings) would have to be high enough to discourage the continuation of this practice. Costs related to rehabilitation on private property are not eligible for Federal or State grant funds under EPA and would have to be paid by the Owner or in conjunction with a locally financed program. However, it is possible that Community Development or Public Works funds could be used or that property owners could give the city a sufficient easement to make the activity eligible for public funds.

The options available include the following:

1. Identify and locate all roof drains and foundation drains and require by ordinance one of the following:
 - (a) Disconnection by the Owner at his expense.
 - (b) Disconnection by the Owner at Owner's and local government's expense (a maximum limit could be established).



SEWER BACK-UPS

LEGEND

- REPORTED SEWER BACK-UPS



PRIME SERVICE AREAS AS ESTABLISHED BY THE CITY OF DES MOINES, IOWA FOR COMMUNITY DEVELOPMENT PROGRAMS.

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- (c) Disconnection by the Owner (with prior approval) at local government's expense.
 - (d) A charge could be added to the sewer use fee for the service based upon the size of the area drained if the flows could not be economically disconnected.
2. Evaluate the sewer capacity required and/or construct equalization basins to handle the increased flow from these sources and rehabilitate the collection system where necessary. Leave all foundation and roof drains connected.
- (a) Increase the sewer use fee.
 - (b) Make a charge to those Owners with foundation or roof drains.

The above alternatives appear severe; however, flows from these sources create economic hardships to individuals who experience basement flooding as well as representing a higher cost to the entire population due to increased capital and operation costs necessary to transport and treat these extraneous flows.

The removal of foundation drains and roof connections is being addressed separately under Sewer System Evaluation Surveys being conducted by individual communities where excessive infiltration/inflow or clear water, such as that emitted from foundation drains and roof connections, has been determined.

With adequate education and participation and with imaginative financing, it should be possible to make a major improvement in these conditons.

Water Conservation. Water can be conserved in the home, commercial establishments and industries by various control techniques. A substantial reduction can be realized through the use of flow restrictors on water faucets and shower heads. Devices such as these can result in water savings of 50 to 70 percent and have been termed "effective" by EPA studies. Water-saving toilets can conserve water by improved float assemblies, reservoirs which hold less water (3.5 to 2.5 gal), dual-flush-cycle - that is one cycle for solids and one for liquids (2.5 and 1.25 gal.) and vacuum system type toilets which recycle a portion of the wastewater.

Other water conserving devices include a premixed hot and cold water fixture which delivers water at a preset temperature, pressure reducing valves and waterless toilets. With the use of the above mentioned flow controls an average household could expect a water savings of approximately 30 percent.

The primary use of these devices is in future building construction and it is doubtful if a significant impact could be made on existing homes and buildings.

A natural trend is occurring in industry and manufacturing companies to conserve water. In some cases, the quantity of water wasted is not known to management and industrial water and wastewater surveys can be helpful in locating possible areas where significant savings can be realized. Such surveys could become a service provided by either the water or wastewater management utility in conjunction with either the gas or electrical utility.

An important aspect of water conservation is the voluntary willingness of the public to use less water than they now use. This can be accomplished through public education programs which are aimed at changing established habits. The consumer should be aware of water supply, treatment, transmission and storage costs as well as wastewater collection and

treatment costs incurred by wasteful use of water. Awareness of pollution resulting from wasteful use of water can be accomplished through interested voluntary organizations, pamphlets inserted with the sewer bills and a variation of posters for schools, buses, billboards, etc.

Mobile Homes. In the United States in 1976 of the 1,500,000 new dwelling units provided 270,000 or 18 percent were mobile homes. These have become an important means of providing owner-occupied housing for moderate and lower income families. In the Des Moines area generally, mobile homes are required to be located in a mobile home "park". For the most part these parks have located in unincorporated areas and have provided their own sewage treatment. Of the ten "parks" in the 208 program, eight employ one or two-cell lagoons and two utilize extended aeration package treatment plants. Placing these "parks" in outlying, rural environments is socially undesirable. Adverse effects may be mitigated by better site planning. Locations in urban areas where they may connect to municipal wastewater treatment facilities should be chosen.

Recreation

A major social benefit from the 208 program will be the recreation benefits from improved water quality. "Outdoor Recreation in Iowa" (Iowa Conservation Commission, July, 1972) indicated that approximately 80 percent of Iowans over 12 years of age picnic, 30 percent boat, 20 percent fish, and 10 percent hunt. Significant increases are observed in the use of almost all outdoor recreation facilities. The 1972 report estimated 1980 activity days for Central Iowa (Region VII) as follows:

Family picnicking	4,300,000
Fishing	2,800,000
Pleasure boating	1,700,000
Swimming	1,100,000
Camping	1,100,000
Water Skiing	300,000

This study noted severe deficits in facilities provided for picnicking, swimming and camping.

The City of Des Moines is notable for the extensive parks along the Raccoon River. The city with the assistance of grants from the Bureau of Outdoor Recreation is vigorously pursuing a program providing public parks along all of the Des Moines River. The Land Use Intensity Plan specifies such an arrangement and, in addition, proposes public open space or permanently reserved open space along all of the major streams and drainageways.

Major recreational opportunities are provided at Lake Red Rock and will be provided at Lake Saylorville. A major benefit to be derived from the Des Moines 208 Program is improvement in water quality at Lake Red Rock. Reduction of suspended solids and sediments would be of material assistance in improving the water quality and hence the usefulness of this reservoir.

Improved water quality on the Des Moines and Raccoon Rivers would enable them to be used extensively for such purposes as boating and fishing in addition to enhancing their aesthetic value. Within walking distance or a short driving distance of the metropolitan population, these rivers can provide needed recreation and reduce energy use. With hiking, bicycling and riding trails along the rivers, streams and major drainage areas an entire new transportation and recreation system may be provided interconnecting all parts of the urban area. Such a system could not even be considered if the water quality is poor and the environment unpleasant. These green areas along the rivers and streams would provide excellent wildlife habitat as well.

With good water quality, all of these possibilities for recreation may be realized. Without good water quality none are possible.

Aesthetics

For the most part, the facilities required for water quality improvement would be buried underground, hidden away in unobtrusive locations or

screened, or located in industrial areas such as the new central treatment plant. New trunk sewers that would have to be built along streams or drainageways would be located to do the minimum damage to the natural environment. (See Chapter VI.)

Summary

Social benefits of the 208 program would come from:

1. The management program which would encourage retention of community identity.
2. Greatly enhanced outdoor recreation opportunities.
3. Aesthetic benefits from open space along rivers, streams, and drainageways with water of good quality.
4. Removal of basement back-ups and renewal of neighborhood confidence in areas where these have occurred.
5. Provision of recreation areas close-at-hand requiring minimum energy expenditure.
6. A management system providing for the maximum in public participation and response.

The 208 program could be expected to result in the following social problems or costs:

1. Difficult land-use control problems along trunk sewer lines traversing areas that should remain in agriculture.

2. A possible increase in land use controls such as minimum lot areas for septic tank use that will be difficult to enforce.
3. Lateral sewer systems in certain outlying communities and in certain unincorporated areas that will be extremely expensive on a per-family basis and that would require financial assistance to an extent greater than that previously provided.
4. A management system requiring a greater awareness of areawide needs and approaches than may be possible to attain.

Economic and Social Impacts of Alternate Plans

Economic Impacts

The annual costs of areawide plans varied from a low of \$11,719,000 to a high of \$12,353,000, a difference of only 5.4 percent, probably less than the probability of error in such preliminary estimates of plus or minus ten percent. Generally the economic impacts can be considered to be the same.

The variability in economic impacts will depend much more on the methods of financing chosen. For example, if general bonds can be issued and retired from user charges, substantial savings would be made. In the ICA area particularly, the consolidation of effort and financing into a single area-wide agency would smooth out disparities and provide the advantage of a larger unit issuing bonds in larger amounts.

If any of the "Family I" group of management alternatives is used to manage the 208 program, there will be varied economic impacts in different parts of the 208 area. The "Family I" group provide an areawide agency that is charged with planning, programming, priority setting and coordination. It would do no construction or operation. Under such an arrangement, there

would be difficulties in financing some of the improvements called for in the plans.

However, the economic and other problems cited above would be identical for all alternatives.

Social Impact

Variations in social impact are likely to result more from the management than from the facility alternatives. The proposed management plan would provide an areawide agency that would represent the 26 cities and counties, all of which would participate in its government. This unique arrangement would foster participation of local officials and, through them, participation of the public.

If the areawide agency is created as a sewer district under Chapter 358 of the Iowa statutes, it would be governed by an elected board of three and such a board might not be so responsive to the individual communities or to the public.

If the areawide agency does only the planning, priority setting and coordination leaving the financing to the individual communities or various combinations of them, it is possible to envision long periods of delay as the financing of each project is worked out. A more powerful areawide agency would be better able to carry out the plan.

CHAPTER VI - ADVERSE IMPACTS WHICH CANNOT BE
AVOIDED SHOULD THE PLAN BE IMPLEMENTED AND
STEPS TO MINIMIZE HARM TO THE ENVIRONMENT

Air Quality Impacts

The Intensity Development Plan adopted by the 208 Policy Committee will continue the trend of expansion of the urbanized area and thereby continue the trend of increasing use of private automobiles. This will have an adverse effect on air quality (primarily carbon monoxide) in some parts of the denser urbanized areas, particularly under atmospheric conditions which disperse pollutants slowly.

The success of current air quality maintenance plans will rest heavily on the success of auto manufacturers in building low-emission engines without increasing fuel consumption. Other means of minimizing harm would be to increase car pooling, to place certain restrictions on private cars on traffic thoroughfares well served by public transportation or to expand the scope of public transportation throughout the metropolitan area.

Impact on Land and Land Use

Approximately 200 acres of land (much of it agricultural land though not all Class I and II) will be required in outlying communities for construction and expansion of wastewater treatment lagoons. Based on recent agricultural statistics in the area, it would be reasonable to expect those 200 acres to produce approximately 8,000 bushels of corn per year, 2,000 bushels of soybeans per year, 500 bushels of oats per year with approximately 50 acres remaining for pasture and other crops.

Approximately 25,000 acres of cropland will be used over the next 20 years for urban development, according to the Intensity Development

Pattern. This land could produce 1,260,000 bushels of corn per year, 285,000 bushels of soybeans per year and 56,000 bushels of oats per year.

To minimize the impact of these land takings on agricultural production, lagoons and urban development should be located wherever possible on land that is marginal in productivity.

Disruption by Sewer Alignments

Semi-natural Floodplain Habitats

Temporary disruption of vegetation and wildlife habitats would result from construction and placement of sewer pipes along approximately 2-1/2 miles of the lower Beaver Creek; approximately 3-1/2 miles of the Des Moines River near the northern City limits; approximately 12 miles along the Lower Fourmile Creek and approximately nine miles along the Lower East Branch of Fourmile Creek. Excavation for placement and covering of the sewer pipes would result in the loss of shrubs and trees for much of these distances as well as herbaceous vegetation which provides cover for many birds, rabbits, squirrels and amphibians.

Steps required to minimize harm include cutting the minimum necessary swath of vegetation for trenching and pipe placement; final alignments which minimize the taking of intermediate and mature trees; filling and regrading of backfill material as quickly as possible after trenching; special provisions to ensure that the final cover material over trenched areas is soil equal in quality to the topsoil removed during excavation; replanting excavated areas with materials that are native to the disturbed areas or otherwise well suited to it; provision for several post-construction inspections to identify and remedy areas where special erosion control and/or replanting are advisable.

Urban-Suburban Areas

Approximately four miles of pipe construction are required through the urban center of Des Moines along the Des Moines River; approximately 9-1/2

miles downstream of the urban center along the Des Moines; and approximately 10-1/2 miles along Yeader Creek and Middle Creek. These alignments will interrupt traffic and other urban activities to varying degrees depending on exact location; they will be disruptive because of construction noise; and they may generate substantial amounts of fugitive dust during construction, depending on weather and soil moisture conditions.

To minimize harm in these settings, it will be necessary to plan adequate auto and pedestrian traffic re-routing in advance for each excavation step along the alignment; special traffic signaling and/or police patrol may be required; protective shields may be required in certain areas to minimize safety hazards to pedestrians; and in the event of high dust generation, spraying earth mounds with water may be required from time to time.

Within urban and suburban areas there are also more localized pockets of trees and mixed vegetation which provide scenic relief and some wildlife benefit. Wherever possible, alignments should be selected which minimize the taking of trees and severing of semi-natural areas of vegetation. Where taking of such areas is inevitable, all steps described above for semi-natural floodplain habitats should be followed.

The Areawide Wastewater Agency (AWA) will be required to communicate with the Des Moines Section Office of the Federal Aviation Administration (FAA) prior to the initiation of construction or maintenance activities near FAA installations for the purpose of preventing damage to buried cables and preventing interference with electronic instrumentation used in aviation.

Construction of Facilities over Surficial Aquifers and Floodplain Areas

Much of the sewer alignment along the Des Moines River and Fourmile Creek would lie over surficial aquifers (where substantial groundwater

recharge takes place) and in floodprone land areas. The new treatment plant would also lie over a surficial aquifer, and part if not all would be reached by the 100-year flood level.

To minimize the potential environmental hazard of these placements, all materials used for sewer construction should meet the strictest reasonable specifications for material strength, quality of joint welds, reliability of pumps at lift stations including back-up systems, and stability of earth materials used in securing the placement of the pipes underground. Protective dykes should be used around the treatment plant to at least meet the 100-year recurrence flood level. Test wells should be used in the vicinity of the treatment plant to monitor groundwater quality on a regular basis after the plant is operating.

CHAPTER VII - RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

In this discussion, "local short-term uses" of the environment means uses of land, water, air and other natural resources (including those required for generation of necessary electrical and mechanical power) to collect, treat and dispose of wastewater in the Des Moines 208 study area and those resources required to prevent or minimize the impact of rural and urban non-point sources of water pollution in the study area. "Long-term productivity" means the on-going, more or less stable operation of the natural and man-modified ecosystems which make up the study area, namely river ecosystems, agricultural ecosystems, conserved natural ecosystems (such as upland and lowland terrestrial forests, lakes and wetlands) and the urban ecosystem. More detailed descriptions of each ecosystem type were developed in an earlier phase of this study.

The long-term productivity of all river ecosystems and all wetland ecosystems in the study area depend critically on reaching the water quality goals set forth in the first phase of this study. Fish, the food and breeding grounds they depend on, and aquatic organisms that mineralize organic waste products all require levels of water quality not achievable without the improvements in wastewater treatment recommended here. Uncontrolled runoff from agricultural lands and feedlots would eventually overburden the capacity of nearly all streams and rivers to assimilate the waste products and nutrient and sediment loadings received. The proposed plan would protect water quality in the study area from further degradation and in many cases allow slow, steady improvement in water quality, thereby improving conditions for aquatic animals and the stability of the ecosystem of which they are a part.

Long-term productivity of the agricultural ecosystem depends on conservation of soil fertility, which requires runoff control to hold soil moisture and applied organic and inorganic fertilizer supplements. It also requires protection of groundwater quality for outlying residents using shallow wells as sources of potable water. In addition, cost-effective methods of soil tillage and protection of soil fertility are important in view of rising fertilizer, fuel and machinery costs. Long-term objectives should include maximum use of agricultural and other organic wastes for soil conditioning and maintenance of fertility, tillage methods which minimize the number of machine trips over cultivated lands per growing season, and the maximum use of vegetation buffers and other non-structural techniques for conservation of soil water in well-drained areas.

The conserved natural ecosystems require protection from other uses except those consistent with the conservation management objectives and the water-related ecosystems depend on good water quality in the same way river ecosystems do. They harbor most of what remains of wildlife populations, they protect water quality in many cases by allowing efficient natural recharge of groundwater; they protect air quality by direct assimilation of certain pollutants and by decreasing local densities of air-polluting land uses; they aid in noise abatement in the same way as in air pollution abatement and they provide visual and aesthetic relief from a sometimes monotonous landscape.

Long-term productivity of the urban ecosystem relates most critically to the short-term uses discussed here in that it requires a safe, reliable and affordable source of potable water to support a growing number of people. This component of the urban ecosystem is particularly sensitive to the quality of storm runoff from rural and urban surfaces. While effective treatment methods are available for minimizing hazards associated with pathogenic bacteria, dissolved minerals and suspended particles, adequate protection against viruses and stable organic compounds less easily filtered or precipitated is less sure. The first line of defense in potable water procurement is a watershed which generates a minimum of hazardous compounds.

VIII-1

CHAPTER VIII - IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES RESULTING FROM THE PLAN

Land and energy (primarily electrical) are the two greatest areas of resource commitment resulting from the plan. Facility plans for outlying areas will require approximately 200 acres for construction of new and enlargement of existing waste treatment lagoons. Between 35 and 40 acres of urban land are required for construction of the equalization basins throughout the urbanized area designed to prevent sewer back-ups during storm flows. Approximately 5-10 acres will be required for flow separators. A strip of land roughly 50 miles in length and 50-150 feet in width depending on pipe size and specific land form will be excavated for placement of sewer pipes. The new areawide treatment plant will require approximately 70 acres of land now zoned for industrial use.

The land commitment having the greatest long-term impact is the agricultural land required in outlying areas for waste treatment lagoons. Wherever possible agricultural takings should be minimized in the siting of these lagoons.

Total estimates of energy required per year to operate all transport and treatment facilities are in the range of 17 million kilowatt-hours per year of electrical energy, roughly 30,000 gallons of fuel to operate sludge-hauling trucks and approximately 130,000 gallons of fuel oil or its equivalent to heat buildings associated with the areawide treatment facility.

Disposable supplies required for treatment plant operation are primarily chlorine (roughly 300 tons per year) and polymers to aid coagulation and settling (roughly 250 tons per year).

CHAPTER IX
COMMENT ON DRAFT EIS AND RESPONSE
(Complete comment letters shown in Appendix C)

Federal Agencies

Federal Aviation Administration

Comment: We can, in general, express concern that large machinery or disruption of the earth's surface, especially mounding, near some of our electronic aids such as VOR, ILS, and radar will cause them to be unreliable. Loss of these aids could create unsafe conditions.

Also, it has been our experience that digging near many of our facilities can result in loss of power and control cables from cutting. When this happens to critical facilities such as radar and communications, near panic situations can develop.

Response: Consultation with the Planning and Appraisal Staff of the Federal Aviation Administration in Kansas City has led to an agreement to include in the Final EIS provisions for coordination between the FAA Sector Office in Des Moines and the Area-wide Wastewater Agency (AWA). Such coordination will be required prior to all major excavations and disruptions to the earth's surface and the use of large machinery. The Sector Office will be able to inform all concerned as to the location of electronic aids such as microwave cables and radar equipment and thereby insure their protection and reliability.

Federal Highway Administration

Comment: Although these two freeways (Routes 500 and 592) are not in the Iowa DOT's current five-year plan, portions of these freeways will probably be complete by the year 2000. The Final EIS should address impacts or anticipated impacts related to these transportation improvements and associated developments.

Response: Highway planning and development must be implemented in such a manner so as not to preclude the goals of the Des Moines 208 Water Quality Plan. Any highway routing must be consistent with the provisions of the plan. Therefore, to minimize secondary impacts of the highways' locations (e.g., noise, infrastructure strains, and population shifts and changes), they should be routed in a manner which is consistent with expected growth as described in the Intensity Development Pattern. (See also letter from Central Iowa Regional Association of Local Governments in Appendix D.)

Department of the Interior

Comment 1: Neither the maps nor the text in the document provide sufficient information to determine the precise location of the proposed facilities and, therefore, their impact on recreational, cultural, and mineral resources. Where sites are known we recommend that maps of larger scale and a revised text be employed in the final environmental statement to describe the geographical location and its immediate surroundings.

Response: The plan whose impact was discussed in the Draft EIS was developed after an inventory and analysis of recreational, cultural, and mineral resources (as well as other natural and cultural resources) present in the study area. One of the primary goals of the plan was to achieve specified water quality goals in such a way that negative impact on physical, biological and cultural resources was at a minimum. This goal was achieved with possible exceptions as noted throughout Chapters V and VI of the Draft EIS. For example, there is potential conflict between proposed equalization basins and several outdoor recreation areas (exact locations noted). In each of these cases, design options are readily available which would minimize conflict to acceptable levels.

It must be added, however, that the plan as presently developed does not specify precise locations of facilities, therefore, an accurate map designation of the facility and an accurate assessment of each facility on local resources is not possible. The plan anticipates the need for certain site-specific investigations of possible impact after more precise facility locations are selected.

Comment 2: Where precise construction locations are not presently known, adequate maps and textual descriptions must be included in the subsequent site-specific environmental documents.

Response: According to EPA's Final Regulations for preparing Environmental Impact Statements (40 CFR, Part 6) for wastewater treatment facilities funded under Section 201 of Public Law 92-500, environmental assessments must be submitted to EPA by its grantees and contractors. An assessment must include a description of both the existing and future environments without the project.

Also, when the plan of study is submitted for a project, the proposed planning area must be described in detail and usually includes accurate mapping. The more detailed map would be submitted with the Facilities Plan. No grant for construction of treatment facilities is awarded until the State Historic Preservation Officer (SHPO) has had the opportunity to survey and approve the project area. Even after this approval, if the contractor uncovers an archeological find, construction must be stopped until the SHPO has allowed for construction to continue.

Comment 3: Three areas were identified within the document as being sites of possible conflict between recreational use and projected construction. The planned enlargement of the existing lagoon near Granger is described as being a "hazard" to an upstream wetland area presently utilized by hunters and other recreationists. (and) In Des Moines, two equalization basins.... 10 to 15 feet above the ground, are planned for Prospect Park and another proposed neighborhood park near County Line Road and Fleur Drive. We believe that the mitigation of construction impacts on recreation should be addressed directly and should avoid phrases like "could be resolved" or "may serve". The final statement should set forth specific mitigation measures which will be carried out as part of the construction projects...(and) the loss of recreation land to construction of these and other structures should be quantified for each structure as far as practicable.

There may be conflicts with recreation lands within the study area which cannot be ascertained without larger scale maps and more detailed text. The equalization basin planned for the proposed neighborhood part in the vicinity of Fleur Drive and County Line Road is near Fort Des Moines. Three tracts of this federally-owned property, totaling 244.27 acres, have been conveyed to the Polk County Conservation Board (two parcels) and the City of Des Moines Department of Parks (one parcel) for park and recreation purposes. The provisions of the Instrument of Transfer specify that the property shall not be sold, leased, or otherwise disposed of except with the consent of the Secretary of the Interior. Substitution of properties of at least equal fair market value and reasonably equivalent usefulness and location for the recreational lands to be taken would be required.

Response: It is impossible to specify what is required in the way of mitigation and what will be done in the case of a particular construction project before final proposed plans and facility designs have been completed. In the case of possible conflict between recreational use and projected construction, no decisions can or should be made at this stage of planning which would determine the exact size, shape, depth in the ground, height above the ground, flow through the facility, and exact location of the facility in a general area. It is therefore inappropriate to speculate on the precise impact on cultural, biological or physical resources of the environment. However, the overall strategy for wastewater management as described in the plan anticipates the need for site-specific investigations at the stage of facility design. As noted in the response to Comment 2, existing law makes specific requirements concerning environmental protection as it relates to facility design.

Comment 4: In addition, the outlying communities of Alleman, Mitchellville, Norwalk, and Carlisle have recreation areas which have received matching assistance monies from the Land and Water Conservation Fund (L&WCF). In the Des Moines metropolitan area, numerous projects have also received such funding. The following recreation resources in the metropolitan area may be of particular interest in the preparation of future

documents: (1) the Des Moines Riverfront Bikeway, a Federal Highway Administration Bikeway Demonstration Project; (2) a bikeway between McHenry and Union Parks, partially funded through L&WCF monies; and (3) the proposed Des Moines River. Any temporary or permanent disruption of parklands, including but not limited to the above, and appropriate mitigation should be addressed in subsequent documents.

Response: Comment noted.

Comment 5: Encroachments on properties that have received L&WCF assistance would constitute a conversion of recreation use under Section 6(f) of the Land and Water Conservation Fund Act, as amended. Section 6(f) requires that any change from recreational land use be approved by the Secretary of the Interior and also requires the substitution of other properties of at least equal fair market value and reasonably equivalent usefulness and location for the recreation lands to be taken. Any request for approval should be directed to Mr. Fred A. Piewert, Director, Iowa Conservation Commission.

Response: Comment noted.

Comment 6: We concur that the plan will indirectly benefit recreation through the improvement of water quality, but suggest that more direct benefits could be incorporated into the plan. It would be possible, for example, to acquire and develop lands adjacent to proposed construction sites which could serve both as buffers and as recreational resources in their own right. Another possibility would be to incorporate bikeways or trails on the rights-of-way of sewer trunk-line construction, especially since these will follow stream valleys in most instances. Technical assistance for including recreation planning in the areawide 208 plan is available from the Bureau of Outdoor Recreation, Mid-Continent Region.

Response: EPA agrees that multiple easements can be beneficial to both the environmental and recreational components of a 208 planning area. We have, in the past, consulted with the Bureau of Outdoor Recreation regarding these possibilities for the Des Moines 208 area.

Comment 7: A national historic landmark, the Fort Des Moines Provisional Army Officer Training School, appears to be located close to the proposed facilities near the Warren-Polk County line. We have enclosed a boundary map of the landmark for your information.

Response: Comment and map noted. (See letter from Department of Interior in Appendix C.)

Comment 8: We note that you are working with the State Historical Department in assessing impacts of the undertaking on cultural resources (p. V-37). It is not clear whether the State Historic Preservation Officer has also

been consulted. His participation is required by the Advisory Council on Historic Preservation's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR 800). The results of the proposed "surveys", intensive investigations, and procedures for mitigating adverse impacts" should be in accordance with the Council's "Procedures" and, along with pertinent documentation included in the final statement.

Response: The State Historic Preservation Officer has been consulted since the early stages of the 208 planning process.

Comment 9: The final statement should also reflect procedures to be followed if previously unknown archeological resources are encountered during project development.

Response: See second paragraph of response to Comment 2.

Comment 10: The statement adequately addresses impacts on fish and wildlife resources and the related natural environment. The plan is a big step in right direction and we endorse it wholeheartedly.

Response: Comment noted.

Comment 11. Although one of the primary objectives of the intended sewage disposal system is to prevent increasing contamination of waterways, reservoirs, and aquifers, there are no illustrations in the report that clearly show the drainage pattern or the location of the dams. For a better understanding of their interrelationship, a correlation is required for the drainage basins, aquifers, waterways, and reservoir locations. A statement giving the capacity of the main reservoirs also would be helpful.

We suggest that more specific baseline data on streamflow characteristics of the Des Moines River and its principal tributaries should be obtained. Such data would be useful in evaluating amelioration of hazardous concentrations of pollutants in the river, especially during low flows.

Among the strict specifications to protect ground water, such as those discussed on pages VI-3 and VI-4, linings should be included where lagoons must overlie alluvium or other appreciably permeable materials; downgradient monitoring of ground water should also be standard practice for such situations.

Response: The drainage basins and sub-areas of the study area are shown in Plate II-1 (page II-7) of the Final EIS. Descriptive text on "Reservoirs" includes locations and other facts regarding Saylorville and Red Rock reservoirs (Final EIS page II-14 and II-15). The text has been amended in the Final EIS to show reservoir capacities in units of acre-feet. Plate II-4 (Final EIS page II-59) shows the location of surficial and buried channel aquifers.

Additional information on streamflow characteristics has been added to the Final EIS under "Hydrology" in Chapter II. It should be noted that all assessments of water quality impact of the proposed plan were carried out with respect to low-flow conditions.

The need for linings in lagoons which overlie alluvium or other permeable earth materials is recognized and is fully consistent with the proposed plan. Similarly, the need for downgradient monitoring of groundwater quality in cases where lagoons overlie permeable materials is recognized and is consistent with the proposed plan.

Comment 12: Large volumes of both excavation and fill would be required in constructing lift stations, some 13 equalization basins that have capacities up to 7.72 million gallons, and 9 treatment facilities, plus a regional treatment facility. Moreover, grade stabilization structures and terraces, estimated to cost \$50 million, also would require fill or excavation as would many miles of trunklines. The source of fill material and the area for disposal should be mentioned in the text.

In the final statement, the section on geology should include summary results of the statewide inventory of coal resources and the impacts on coal in the area if minable reserves are indicated. Further, the text should state whether the underground liquid petroleum gas storage is being utilized now and whether its future use would be impaired if the proposed project is constructed.

The coverage on geology does not mention occurrences of building stone, sand and gravel, limestone, road rock, or other minerals that normally are mined near densely populated areas such as Des Moines. Closure or curtailment of any such enterprise would cause environmental changes requiring evaluation in the study.

Response: For reasons noted in response to Comment 3 above, estimated volumes of excavation and fill material are not yet available. Wherever possible, facilities will be designed and located so as to minimize cut and fill activities, since both are very costly. Where these are necessary, the selection of source and disposal sites and the environmental impact of this phase of construction will be addressed in the facilities plan.

Based on information available at the present time, the prospects for commercial production of coal in the 208 study area are not high. It is possible that small-scale mining could develop at distances greater than 20 miles west and northwest of the City of Des Moines at some time in the future, but coal deposits more distant from urbanized areas will be much preferred by mining interests. The prospects for coal mining in Jasper County (east of the study area) appear higher than any in the study area itself.

There is no evidence of acid drainage from areas of past coal mining. Apparently most of the previously mined areas have been effectively sealed by water and/or silt in such a way that pyritic materials are not exposed to air. The water quality hazard associated with acid mine drainage is therefore very small.

Hazard associated with subsidence of old mines in the study area is small and manageable. Engineers familiar with construction and excavation in the Des Moines area know that old shafts are found occasionally and that minor adjustments are nearly always sufficient to reduce hazard (conversation with Matt Avein, July 5, 1977). Those responsible for future construction will need to check for the possibility of abandoned mines under or near each proposed construction site. Information on many such mines is available to the public for planning purposes through the Iowa Geological Survey.

The underground liquid petroleum gas storage caverns are currently in use as components of a distribution system. The continued use of these storage facilities is not inconsistent with the proposed plan.

While there is considerable mining of sand and gravel along the Raccoon and Des Moines Rivers in the 208 study area, there is very little mining of building stone, limestone, clay, gypsum or other minerals that are available in Iowa and were mined earlier in the study area. The plan as presently formulated will not require the closure or curtailment of any mineral extraction enterprise.

Department of Health, Education and Welfare

No response necessary.

Department of the Army

Comment: Future coordination is desired when individual implementation of the proposed actions is taken.

Portions of the proposed plan will require Section 10 and/or Section 404 permits. The draft statement does not address these actions. A discussion of the impacts anticipated in relationship to these requirements should be incorporated in the final statement. I recommend that you contact Mr. Monte Hines, Permits and Statistics Branch, for direct coordination in determining the permit requirements.

Response: Consultation with the Permits and Statistics Branch, Corps of Engineers, Rock Island District, has led to an agreement to include coordination with the Corps during the planning stages of the wastewater treatment facilities required under Section 201 of Public Law 92-500, whether an EIS or negative declaration is prepared for a given facility.

Permits issued under Section 10 of the River and Harbors Act of 1899 are required for any activities in the "Navigable Waters of the United States." Section 404 of Public Law 92-500 requires permits related to "....the discharge of dredged or fill material into the navigable waters at specified disposal sites."

The terms of the agreement just described are consistent with the intent of the 208 plan. Whereas the plan as presently formulated guides the general development of areawide wastewater management policy and facilities, the plan anticipates the need for site-specific investigations related to Section 10 and/or Section 404 permits.

Soil Conservation Service

No response necessary.

State Agencies

Office of Planning and Programming

No response necessary.

Iowa Conservation Commission

Comment 1: The Iowa Conservation Commission has a deep-seated concern for Iowa's water quality. We wish to express our support of upgrading water quality to the 1983 "fishable and swimmable" standards, which the Commission believes is a must for quality recreation and fish and wildlife habitat.

Response: Comment noted.

Comment 2: The Commission urges that growth impacts on resource utilization be thoroughly assessed. We do not support the extension of utilities into those areas of the metropolitan region that promote urban, commercial or industrial development at the expense of natural areas with potential for outdoor recreation, scenic open space and fish and wildlife habitat. We therefore suggest that these sewer extensions be coordinated with a metropolitan land use plan in which growth is accommodated in areas of low natural resource value.

Response: EPA agrees that sewer extensions and other agency initiated projects can induce secondary development and that this development may have deleterious effects related to strains of other infrastructures, services, wildlife and recreation potential, and open space. This is exemplified by a memorandum dated June, 1975 (PRM 75-26), from the EPA Administrator to all Regional Administrators. The memorandum requires that the Agency give particular attention to secondary environmental impacts during review of plans for the construction of publicly-owned treatment facilities with Federal monies.

Land use was an important consideration during the 208 planning process for Des Moines. According to the Central Iowa Regional Association of Local Governments (CIRALG), (Des Moines 208 Areawide Waste Treatment Management Plan, Condensed Report, March, 1977, page 5), "growth in the unincorporated areas that are not now urbanized would be limited, although it is expected that a slight shift in population will occur from rural farm residence to rural non-farm residence." One of the goals of the plan is to "develop and adopt programs for the control of land use, as it relates to water quality." (CIRALG, Des Moines 208 Areawide Waste Treatment Management Plan, Final Report, April, 1977, Page I-1). According to the plan, development will be regulated by conformance with the Intensity Development Pattern (IDP), whereupon the Policy Committee will be responsible for annually updating the IDP for the consideration of changing conditions and, reviewing and approving or denying local governments' requests for deviations from the plan. Zoning and subdivision regulations will be used to achieve development control. Erosion and soil loss programs and ordinances will also be used to provide for necessary growth controls. Finally, development restrictions along regional trunklines may help in achieving these goals by including a statement in the easement that "condemnation of the easement or the construction of the trunkline does not imply any right of use or access to the trunkline." (CIRALG, Final Report, pp. VIII-10 and 11).

The plan calls for passage and adoption of ordinances and other measures as required to protect against development which is inconsistent with the Intensity Development Pattern.

Comment 3: In addition, the Conservation Commission would like to support the multiple purpose utilization of lands and easements acquired for the Areawide Waste Treatment Management Plan. These lands and easements offer the metropolitan region the opportunity to secure open space for recreation and recreational access to area water bodies.

Sewer easements often parallel our communities, rivers, streams, and attractive water bodies; treatment plants often lie near water. Careful preplanning, design, and acquisition of these easements and land with recreation uses clearly in mind will give many benefits (see letter).

Response: Refer to the Department of Interior Comment 6.

Local Agencies

City of Des Moines, Department of Public Health

Comment 1: Des Moines and Polk County air pollution chapters contain restrictions on emissions of odors. Pages V-8 and VI-1 of the draft EIS discuss impacts on air (particulates and carbon monoxide) but do not mention odor emissions from the new sewage treatment plant.

Response: EPA's review of the facility's design will insure that the requirements of Chapter 3B (Air Pollution) of the City Code, including odor limits, will be met. The odor limit (3B-20) requires that an objectionable odor should not be emitted such that the odor can be detected beyond the property line when diluted with seven volumes of unscented air.

Comment 2: On page IV-4 under Sludge Disposal it is indicated that grease collected would be landfilled or burned in an incinerator but page V-8 says no sludge incineration is anticipated. Thus, what, if any, impact grease incineration might have on air quality should be at least mentioned on V-8.

Response: The reference in the Draft EIS to possible incineration of grease noted above is an incorrect one. Incineration of sludge and grease was ruled out earlier in the planning process.

Comment 3: On page V-8 it says that, "The proposed plan would have no major primary impact on the air quality of the City of Des Moines or the region." This department anticipates indirect negative impacts on air pollution due to concentration of new industrial growth along the limited number of trunklines. The draft EIS goes on to say that, "The Proposed plan will have a positive impact on air quality maintenance in the long run..." This department anticipates that the indirect negative impact could be greater than the positive impact derived from open space areas and corridors. In any event, these issues should be mentioned in the draft EIS.

Response: EPA concurs that indirect negative impacts are associated with new industrial concentrations along trunklines. Refer to the response to the Iowa Conservation Commission, Comment 2, for the mitigative and impact minimization measures to be employed to prevent such development along trunklines. While air quality benefits can be expected from the preservation of open space throughout the urbanized area, EPA also concurs that the indirect negative impact mentioned could be greater than the positive open space impact. In that event, special measures may be necessary to further control air emissions from appropriate sources. In the meantime, however, EPA has extensive, ongoing programs to monitor, anticipate, prevent and/or correct violations of air quality standards through air quality maintenance area (AQMA) plans, state implementation plans (SIP), and transportation control plans (TCP).

City of Des Moines, Office of the City Manager

Comment: The area of economic impact has not been addressed completely. The Des Moines 208 Areawide Waste Treatment Management Plan targets 1983 as the date for completion of all proposed trunk line sewer extensions and wastewater treatment facilities. With the completion of the trunk sewer extensions, unincorporated undeveloped land will have a significant economic advantage which will result in direct competition for development with the incorporated areas of the central cities. The Environmental Impact Statement should have addressed, in more detail, the negative impact that sprawled development will have on the central cities.

IX-11

Response: The attached letter from Harland Bartholomew and Associates to Mr. Irv Samec of CIRALG, addresses the economic effects and redistribution impacts of the 208 Plan.

Private Agencies

Iowa Power and Light Company

No response required.

IX-12

April 5, 1977

Mr. Irv Samec
208 Project Director
Central Iowa Regional Association of
Local Governments
104½ East Locust Avenue
Des Moines, Iowa 50309

Dear Mr. Samec:

At Mr. Pryor's request we have prepared the following letter report concerning the impact to local governments in the 208 Area of allowing access to segments of the regional trunk sewers through unincorporated portions of Polk County, in contradiction to policies of the Intensity Development Pattern.

The Intensity Development Pattern estimates Des Moines and the suburban communities will increase in population by 30,000 persons between 1980 and 2000. Satellite communities are estimated to increase 17,200 persons in the same period. Overall a total increase of 47,200 persons is estimated for the 20 year period with distribution of development as shown on the enclosed table.

It is difficult to estimate the strength of the various factors which could determine the distribution of these additional 47,200 persons in the 1980-2000 period; however, we believe the following factors will be crucial: (1) availability of land for development along the trunk (2) the school situation and (3) county vs. city taxes and other market considerations. Given the substantial development taking place in Ankeny and Altoona at this time, we would expect areas along the trunk to receive similar development pressures.

Depending on the above factors we estimate that between 20 and 40 percent of projected growth would be vulnerable to being attracted to the trunkline rather than as shown on the intensity development pattern. For statistical purposes we have utilized 30 percent to show the relative impact such a redistribution would have.

HARLAND BARTHOLOMEW AND ASSOCIATES

Page Two
Mr. Irv Samec

A thirty percent attraction would mean that approximately 14,000 persons or 4700 dwelling units would be diverted to locations along the trunkline. Utilizing an average of \$45,000 per dwelling unit, an investment of some \$21 million dollars in residential development would be located in the unincorporated area. The satellite cities, suburban communities and Des Moines would probably all share in this loss. Commercial and industrial development could be diverted as well. Employment gains of 20,625 persons are projected for the 1980-2000 period. Again utilizing a figure of 30 percent diverted, industrial and commercial development with employment of 6200 persons would take place along the exposed trunks. Based on general standards, we estimate this to approximate \$52 million dollars of commercial development and \$56 million dollars of industrial development.

Overall we estimate a total of \$129 million dollars of new development could be redistributed to areas along the trunklines over the 1980 to 2000 period if access of the trunkline is not controlled.

Should you have any further questions please advise.

Very truly yours,

HARLAND BARTHOLOMEW AND ASSOCIATES

Scott Cantine

By

SC:hep
Encl.

HB
CA

IX-14

POPULATION PROJECTIONS

1980 - 2000

DES MOINES AREA 208

	<u>Est. 1980</u>	<u>Est. 2000</u>	<u>Estimated Population Gain 1980 - 2000</u>
Des Moines	202,000	215,000	13,000
West Des Moines	25,200	32,000	6,800
Urbandale	19,200	26,000	6,800
Windsor Heights	6,600	7,000	400
Clive	6,700	8,000	1,300
Pleasant Hill	<u>3,300</u>	<u>5,000</u>	<u>1,700</u>
Subtotal	263,000	293,000	30,000
 Ankeny	 15,900	 22,000	 6,100
Altoona	3,200	7,500	4,300
Bondurant	<u>1,700</u>	<u>3,000</u>	<u>1,300</u>
Subtotal	26,300	43,500	17,200
 TOTAL	 <u>289,300</u>	 <u>336,500</u>	 <u>47,200</u>

BEFORE THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PUBLIC COMMENT ON THE
DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE DES MOINES 208 AREAWIDE WASTE
TREATMENT MANAGEMENT PLAN

7:35 o'clock p.m.

June 1, 1977

Room 113
Federal Building
210 Walnut Street
Des Moines, Iowa

ARGIE REPORTING SERVICE
(DAVID & KAY ARGIE)
1000 West 70th Terrace
Kansas City, Missouri 64113
Telephone 363-3657

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P R O C E E D I N G S

1
2 HEARING OFFICER REAVIS: Good evening,
3 ladies and gentlemen.

4 Let the record show that this hearing is
5 convened at approximately 7:35 p.m., on June 1, 1977. The
6 purpose of this hearing is to provide an opportunity for
7 public comment on the Draft Environmental Impact Statement
8 for the Des Moines 208 Areawide Waste Treatment Management
9 Plan. And it is held pursuant to Section 208 of the Public
10 Law 92-500, the Clean Water Act and Section 102 of Public
11 Law 91-190, the National Environmental Policy Act.

12 It is also held in accord with a Notice of
13 Public Hearing published in the Des Moines Register on
14 May 8, 11, 12 and 13, of this year.

15 I am Richard Reavis. I'm the Hearing Officer.
16 I am also the Deputy Director of the Water Division of the
17 Environmental Protection Agency, Region VII, Kansas City.

18 I would like to introduce other representa-
19 tives of the Environmental Protection Agency that are with
20 me tonight.

21 On my right, Dar Vallero; Donald Draper
22 toward the back of the room; Dick Ziegler, sitting next to
23 him; Pete Johnson sitting next to him; and at the registra-
24 tion table, Edward Vest.

25 I'd like to establish a framework in which

1 this hearing will be held. The order of presentations that
2 will be given will be in the order that you registered at
3 that desk. and at the door as you came in.

4 If any of you have not registered, why, we
5 would like for you to do so. And if any of you intend to
6 make a presentation and you have not indicated that, why,
7 we'd like for you to do so.

8 The length of the presentations--we really
9 don't have very many that have indicated that they would
10 like to present material and in view of that, I would think
11 that 20 minutes would be ample for most of you.

12 If you have presentations that run slightly
13 longer, I don't think it will give us much trouble, but if
14 you can, try to stay within that framework of time.

15 I think it would be best, those of you who
16 might have questions that you would like to address to the
17 speaker that's making the presentation, that you wait until
18 after all of the formal presentations have been made. And
19 I am sure we will have ample time to address questions.

20 I think you'll find that during the pre-
21 sentations, subsequent presentations, that many of your
22 questions might be answered and save us some time.

23 For the record, I would like for you as
24 you stand to make your presentation to identify yourself,
25 state your address and also the organization with which you

1 are affiliated, if any. That does not preclude any of you
2 making presentations on your own behalf. It is not necessary
3 that you make a presentation for an organization.

4 One last comment--and I think it is probably
5 unnecessary, but I would like for us to stick to the subject
6 that we are here to discuss tonight. Your statements should
7 be relevant to the Draft Environmental Impact Statement. And
8 it is not in the best interest of the hearing to stray too
9 far from that. And I would ask you just to make sure that
10 your statements do address the subject that we are here to
11 discuss.

12 Before we begin the presentations from the
13 floor, Mr. Vallero will make a preliminary statement that
14 gives the basis for the Environmental Impact Statement,
15 the rationale behind it, the purpose of the document. And
16 I think it will probably help us better understand what we
17 are here for tonight.

18 Dan?

19 MR. VALLERO: I am Dan Vallero from the
20 Environmental Protection Agency in Region VII. I am the
21 Project Officer for the Des Moines 208 Plan in preparing the
22 document.

23 Section 208, as Dick said, is a section
24 which encourages and facilitates the development and imple-
25 mentation of Areawide Waste Treatment Management Plans. And

1 it's done so according to guidelines published in the
2 Federal Register by the Environmental Protection Agency,
3 EPA.

4 The Governor of Iowa has determined that
5 the Des Moines, Iowa Area has substantial water problems
6 and therefore it has been designated as such. And he has
7 also designated the Central Iowa Regional Association of
8 Local Governments, CIRA, to be the representative organi-
9 zation which will be capable of developing effective, an
10 effective management plan for the area.

11 The development of the plan has been funded
12 by EPA and includes or will include the identification of
13 required treatment works, construction priorities, regula-
14 tory programs, agencies which are necessary to implement
15 the plan's provisions, requisites for fulfilling acts, goals
16 and objectives and residual solid waste. The primary section
17 is to achieve the overall quality control specified in the
18 Act as to have protection and propagation of fish, shell
19 fish and wildlife. And it provides for recreation in and
20 on the water by July 1, 1983.

21 Some of the additional goals, as you had a
22 chance to look at the document, which were laid out by
23 CIRA I'll read to you:

24 "To maintain the surface and ground water
25 quality for the optimum beneficial use of the resources.

1 "To implement and carry on areawide waste
2 treatment plan process which will assure the adequate and
3 orderly control of pollution.

4 "To develop an intensity development
5 pattern for the metropolitan area which will provide for
6 water quality projections and provisions for controls.

7 "Plan and rejuvenate adequate waste water
8 and drainage facilities in accordance with the intensity
9 development pattern which is laid out in the document for
10 the purpose of providing growth and giving direction to
11 development.

12 "Develop programs for the control of land use
13 as it relates to water quality.

14 "Develop a management system with the
15 capability and authority to construct and operate a high
16 quality waste treatment system for the whole metropolitan
17 area.

18 "Encourage and solicit public participation
19 in waste water management planning.

20 And finally, "To maximize cost effective-
21 ness and utilization of available funds."

22 And important consideration that we thought
23 you might be interested herein is that--and I'm sure most
24 of you know it--but this plant will not only serve for the
25 integrated community area, the ICA, the--but it also serves

1 for the--for all of the outlying communities within the 208
2 Area.

3 CIRA's work has come in four phases.

4 Phase No. 1 was aimed at the inventory and
5 evaluation of the elements required to complete the plan
6 first off.

7 And then Phase No. 2 consisted of developing
8 screening for managements technical alternatives.

9 Phase No. 3 was directed toward developing
10 screening of selected areawide alternative plans.

11 And Phase No. 4 consisted of developing
12 details which will be necessary to implement the final plan.

13 The reason we are here tonight is another
14 law which is known as the National Environmental Policy Act
15 of 1969, the particular section in that law, No. 102-C
16 which requires that all federal agencies prepare some type
17 of statement, document, with regard to any federal actions
18 which will have a significant impact on the quality of the
19 human environment.

20 And this would be prepared by the responsible
21 official; in this case, Mr. Charles Wright, the Acting Regional
22 Administrator, has determined that this 208 Plan is a
23 major federal action which will have a significant impact
24 on the human environment.

25 This statement which we refer to as the

1 Environmental Impact Statement or EIS must address by law
2 the following:

3 It must address the environmental impact
4 of the proposed action.

5 Any adverse environmental effects which
6 cannot be avoided should the proposal be implemented.

7 Alternatives to the proposed action.

8 Relationships between local short-term uses
9 of man's environment and the maintenance and enhancement
10 of long-term productivity.

11 And finally, any irreversible and irretriev-
12 able commitments of resources occurring should the proposed
13 action be implemented as planned.

14 You may notice going through the document
15 that it is broken down in that particular order in chapters
16 to make it a little easier for you to determine which part
17 of law we are fulfilling at any certain time.

18 This Section 102 also requires that copies
19 of the statement and comments from appropriate federal,
20 state and local agencies shall be made available to the
21 President, the Council on Environmental Quality and to the
22 public.

23 Incidentally, we are in the process now of
24 receiving comments on the Draft Environmental Impact State-
25 ment. We will receive comments up until June 6 which is

1 next Monday.

2 If you want to make any statement and have
3 it included in the initial publication, please do. Also,
4 we are closing the hearing date for June 15. So if you have
5 something you want to have in the hearing record, you know,
6 have it in by June 15. And it will also be included in the
7 final EIS.

8 This public hearing is one means by which
9 EPA is trying to receive information which will influence
10 our planning and our particular decision making in this
11 exercise and project. And it will make most use of the
12 citizens and organizations like yourself who would like to
13 have some type of input into the planning process.

14 A public hearing, as Mr. Reavis said, was
15 held on April 6, 1977. That particular public hearing was
16 held for the Plan itself. This public hearing is aimed
17 at receiving input on the EIS for the Plan now. There's a
18 difference there. Although anything to do with the environ-
19 mental impact from this Plan we'll receive and we will
20 welcome any comments you have.

21 Another goal of this hearing is to receive
22 information about the individual waste treatment facilities
23 proposed for the No. 208 Area. Some of them are mentioned
24 in the EIS and some are mentioned in the phase reports.

25 Information that is received by the time

1 it's necessary to be received will be included in the final
2 environmental impact statement and will be used in our
3 decision making for this particular project.

4 HEARING OFFICER REAVIS: Thank you, Dan.

5 We will now proceed with the formal pre-
6 sentations by the people that have indicated they desire
7 to make such presentations. I think that the speakers will
8 find it more comfortable to come to the rostrum where you
9 have a place to put your papers if you have them.

10 So as I call your names, again, I would like
11 for you to come up here, identify yourself, give your
12 address, the organization, if any, that you are affiliated
13 with and then make your statement.

14 Mr. Hol? And again, we are going in order
15 of people who have signed up at the door.

16 MR. HOL: I would like to pass at this time,
17 sir. I have a question later on.

18 HEARING OFFICER REAVIS: It's quite all
19 right, Mr. Hol.

20 Mr. Ferrell?

21 MR. FERRELL: This is a statement from
22 the Central Iowa Regional Association of Local Governments,
23 the designated planning Agency that was responsible for the
24 preparation of the 208 Plan. And it is addressed to the
25 U.S. Environmental Protection Agency, Region VII, in Kansas

1 City, Missouri.

2 And it states:

3 "The Central Iowa Regional Association of
4 Local Governments, CIRALG, has reviewed the Draft Environ-
5 mental Impact Statement prepared for the Des Moines 208
6 Areawide Waste Treatment Management Plan prepared by the
7 Region VII office of the U.S. Environmental Protection
8 Agency.

9 "Accordingly, review comments on the Draft
10 EIS have been developed and are transmitted herewith. The
11 comments are, in general, an overview of the 208 Plan with
12 respect to other current trends and relationships within
13 the State and specifically the eight county area represented
14 by CIRALG. With respect to the contents and conclusions of
15 the Draft EIS, we are in agreement with the analysis and
16 urge that the Draft EIS be given a favorable determination.

17 "The 208 Plan for the designated area of
18 Polk, Dallas and Warren Counties and the municipalities with-
19 in the above area have developed an Intensity Development
20 Pattern for land use intensity and distribution. Even
21 though the specific areas do not coincide, the Des Moines
22 Urban Area Transportation Policy Committee had adopted the
23 Intensity Development Pattern for use in transportation
24 planning with the urban area which is portions of Polk
25 County, and Des Moines, Pleasant Hill, Johnston, Urbandale,

1 West Des Moines, Windsor Heights and Clive. This inter-
2 relationship and common denominator between planning
3 functions will provide conformity between the goals and
4 end-products of these two vital areas of concern.

5 "In addition to transportation planning,
6 CIRALG's Regional Housing and Land Use Policy Committee
7 elected to assume the 208 Plan's Intensity Development
8 Pattern and to continue regional land use considerations
9 and planning efforts for the eight county area in a manner
10 compatible with the 208 IDP. Again, this demonstrates
11 compatability of the Des Moines 208 Plan with regional
12 policy and goals.

13 "Based on the implied intent of the 208
14 Intensity Development Pattern with respect to regional and
15 subregional land use planning efforts, it is urged that
16 Federal and States Agencies make a concerted effort to con-
17 sider the regional and subregional intensity development
18 concepts in their planning functions. This would result
19 in a more uniform and locally acceptable approach than has
20 been historically conducted in the past with respect to
21 federal and state programs and planning functions.

22 "The Des Moines 208 Plan proposes specific
23 controls for nonpoint sources of pollution within the study
24 area. Specifically these controls include increases in
25 cropland conservation measures, erosion control practices

1 for construction sites and a reduction in the rate of
2 development in unincorporated areas.

3 "These controls were developed based on an
4 identification of critical water quality impacts within the
5 area receiving streams. In order to achieve the level of
6 water quality predicted within the 208 Area from institution
7 of the above control measures, there will have to be a
8 coordinated effort between the Iowa Department of Environ-
9 mental Quality, which is responsible for statewide 208
10 Planning, and the designated Des Moines 208 Management
11 Agencies. This effort must be directed at achieving a
12 mutually beneficial control program for nonpoint sources of
13 pollution that affect the water quality in the major Des
14 Moines 208 Area receiving streams, which primarily, are
15 impacted to a greater degree from nonpoint sources located
16 outside of the Des Moines 208 Area.

17 "Failure to achieve this mutual level of
18 nonpoint source control will result in a discontinuity of
19 overall goals and efforts between the state and Des Moines
20 208 Planning Areas and frustration of the efforts within the
21 Des Moines Metropolitan Area to control nonpoint sources of
22 pollution.

23 "With regards to nonpoint source pollution,
24 resulting from urban and construction site runoff in
25 developed areas, within the Des Moines 208 Study Area, there

1 has been developed alternative control measures that may
2 be applied to specific areas or sites having localized water
3 quality impacts. These control strategies are not intended
4 to be applied on an areawide level, but could be utilized
5 for specific instances and locations thus allowing an
6 overall flexibility within the area for control of urban
7 runoff.

8 "Development impacts from conversion of
9 agricultural-open spaces to a higher intensity use are
10 proposed to be controlled from two aspects:

11 "On, through nonpoint source controls
12 which are outlined above.

13 "And, two, through regulation of sewer
14 connections to the major interceptor sewers where the
15 sewers pass through presently underdeveloped areas.

16 "With respect to Item No. 2, regulation of
17 sewer connections in underdeveloped areas, there are
18 adverse socio-economic impacts that could result if no
19 control was exercised.

20 "Namely these impacts are:

21 "One, movement of development in the area
22 from presently developed areas with an associated first
23 cost economic loss of \$129 million to the presently in-
24 corporated areas.

25 "In addition, loss of population and a

1 decrease in the tax bases associated with the movement to
2 outlying areas.

3 "In addition, loss of allocated sewer capa-
4 city due to a redistribution of flow generators from that
5 used initially for the design and sizing of facilities.

6 "The control of these potential develop-
7 mental impacts can only be effectuated through use of
8 present or future regulations of the U.S. Environmental
9 Protection Agency, the Iowa Department of Environmental
10 Quality and the Des Moines 208 Management Agencies.

11 "It is therefore inherent that control mech-
12 anisms be coordinated and adhered to by and between the
13 three levels of regulation, Federal State and Local, to
14 achieve the desired final product as well as achieve the
15 goals of the locally instituted 208 Plan.

16 "The areawide technical plan proposes im-
17 provements for control and treatment of pollution resulting
18 from point and intermittent point sources. The major points
19 concerning the implementation of the technical plan are:

20 "One, reduction in the number of point
21 source discharges within the area.

22 "Two, cost savings in capital and operating
23 costs resulting from a reduction of point source facilities.

24 "And, three, cost savings in the selection
25 of flow separators fro combined sewer overflows versus
complete separation or treatment of combined sewers.

1 "Four, the determination on an areawide
2 level of the most cost-effective combination of treatment
3 systems and effluent limitations which new facilities must
4 be designed for.

5 "With respect to treatment facilities, the
6 final areawide plan for sewage treatment will result in a
7 cost savings both in first cost capital expenditures and in
8 annual operation and maintenance costs. Capital cost savings
9 will result from construction of a centralized facility
10 versus upgrading and expansion of each individual treatment
11 facility within the integrated community area to meet
12 effluent wasteload limitations.

13 "Due to the fact that many of the existing
14 treatment facilities will be phased out with treatment being
15 centralized at the new main plant, effluent limitations
16 on the new plant will be less stringent. The estimated annual
17 cost savings in operation and maintenance costs of the new
18 plant with the less stringent wasteload allocations is
19 approximately \$190,000.00 per year.

20 "Construction of a new treatment facility
21 instead of upgrading the existing main treatment plant will
22 result in an annual cost savings and operations cost of
23 approximately \$311,000.00 per year.

24 "As part of the technical plan implementation,
25 it is proposed that collector sewer systems be constructed

1 in areas presently served by septic tanks. The estimated
2 cost for providing these collection systems is approximately
3 \$10.5 million. Under current grant funding policy, the Iowa
4 Department of Environmental Quality does not make grants for
5 construction of collector sewer systems. It is recommended
6 that this policy be changed in allocation of funds for the
7 Des Moines 208 Area.

8 "The impact on ground and surface water
9 quality, as well as potential health hazards resulting
10 from the areas with septic tanks, should be a prime considera-
11 tion in establishing priorities for grant eligibility.

12 "Additionally, the grant funding of flow
13 separators for combined sewer overflows should also be
14 given priority funding with the Des Moines 208 Area. Lack
15 of grant funding for the above improvements may result in
16 a continuation of water quality problems within the area due
17 to a lack of local financial capabilities and resources.

18 "The Des Moines 208 Plan proposes a plural
19 management system consisting of local units of government
20 responsible for the implementation of functions pertaining
21 to Section 208 requirements of the Federal Water Pollution
22 Control Act Amendments of 1972. Through an intergovern-
23 mental agreement, the local jurisdictions agree to jointly
24 and acting through CIRALG and the Sewer Policy Committee
25 to implement the requirements of Section 208 of the law.

1 "The Section 208 requirements specified
2 are namely priority setting, annual update of the 208 Plan
3 and coordination of the activities on an areawide basis.

4 "This proposal for assignment of management
5 responsibilities resulted from several factors:

6 "One, the time required to establish a new
7 management agency to assume all wastewater management
8 functions.

9 "Two, the critical period of implementation
10 of the technical plan to meet 1983 water quality goals
11 could have been delayed while the management system was
12 being established.

13 "And, three, all participating units of
14 government presently have the authority and institutional
15 arrangements for implementing most of the Section 208 re-
16 quirements. However, an areawide planning, coordinating
17 and priority-setting mechanism was lacking.

18 "Recognizing the above philosophy and
19 decisions of the local units of government, the Des Moines
20 208 Management System is in the process of being established
21 and implemented at the present time. The plural management
22 structure is proposed to extend for a two year period until
23 a final management system is selected by the local govern-
24 ments. During the two year period, analysis of other manage-
25 ment structures will be made as well as testing of the plural

1 management system to determine its capabilities for areawide
2 waste treatment management. Utilizing this implementation
3 approach for management of areawide waste treatment will
4 result in the immediate implementation of the technical plan
5 elements which are vital in achieving the 1983 water quality
6 goals within the Des Moines 208 Area.

7 "A direct and immediate result of implemen-
8 tation of the management system will be the continued fund-
9 ing of sewer system evaluation surveys within the areas
10 having excessive infiltration inflow. As stated in the
11 EIS concerning the problem of excessive clear water entering
12 the sewer systems:

13 'The result has been sewer back back-ups
14 that plague rather large parts of the urban area. These
15 cause health hazards and loss of confidence in the neighbor-
16 hood. Many of the sewer back-up areas correspond with areas
17 occupied by the lower income groups.'

18 "Continued and immediate funding of these
19 studies along with rehabilitation projects within the next
20 two year period will greatly improve current conditions
21 within the areas experiencing sewer back-up problems.

22 "In conclusion, the results of the two-year
23 planning process have resulted in a workable plan for manage-
24 ment of water quality problems in the Des Moines Area and
25 represents effective cooperation among local governments in

1 developing sound approaches for solving mutual problems.
2 In this regard, it is considered that the Des Moines Areawide
3 Waste Treatment Management Plan will have a very positive
4 effect on the quality of the environment with the Des
5 Moines Area."

6 Signed by, Clarence Millsay, Chairman of
7 the Des Moines Metropolitan Sewer Planning Policy Committee
8 and Dennis Harney, the Executive Director of CIRALG.

9 HEARING OFFICER REAVIS: Thank you, Mr.
10 Ferrell.

11 Jean Williams?

12 MS. WILLIAMS: My name is Jean Williams and
13 I'm Chairman of the Des Moines Advisory Committee on
14 Environmental Quality. I am delivering a statement that--
15 a resolution that we passed in April. And it was delivered
16 to the areawide hearing, but there are parts of it that
17 do apply to the Environmental Impact Statement. So I will
18 just read it. It is just a resolution.

19 I forgot to give you my address. Jean
20 Williams, 314 42nd Street, Des Moines, Iowa.

21 "At the formal 208 waste treatment hearing
22 on April 6, the Des Moines Advisory Committee on Environ-
23 mental Quality present the following resolution:

24 "The Des Moines Advisory Committee on
25 Environmental Quality supports the basic Des Moines 208

1 Areawide Waste Treatment Management Plan as an urgently
2 needed activity to preserve water quality and protect public
3 and private properties and it encourages implementation of
4 the Plan as quickly as possible.

5 "In conjunction to DNACEQ's support, however,
6 the Committee strongly recommends the following:

7 "One, that citizen's be informed and involv-
8 ed at hearings in addition the the one tonight. One good
9 time would be when the improvement design is completed so
10 the public will be informed as to who and what will be
11 affected.

12 "Two, that along trunk lines, at equaliza-
13 tion basins, at separator sites and at the main plant site,
14 the natural environmental elements, that is, trees, wildlife
15 cover, rare plant life, etc. be carefully considered and
16 protected whenever possible, including using as little as
17 actual construction space as feasible and leaving sites as
18 good as or better than they were originally.

19 "Three, that a high priority be placed on
20 considering use of the land space consumed by trunk lines
21 and equalization basins as recreational facilities such as
22 bike-hike trails, tennis courts or small park-picnic
23 facilities if location justifies it.

24 "Four, that the control strategies for non-
25 point pollution sources mentioned in the proposal as listed

1 below be aggressively corrected:

2 "(a) Construction site erosion.

3 "(b) Promotion of cropland run-off control
4 through the Soil Conservation Commission.

5 "(c) Reduction of urban development in the
6 unincorporated areas."

7 HEARING OFFICER REAVIS: Thank you very much,
8 Ms. Williams.

9 The next person who has indicated a desire
10 to present a statement is Marilyn Staples.

11 MS. STAPLES: I am Marilyn Staples, 3509
12 Calder, League of Women Voters of Metropolitan Des Moines.

13 My statement is the same one we made on
14 April 6 in response to the Environmental Impact Statement
15 which was carefully read, we do believe that the technical
16 one is the best one that will improve the environment and
17 that it should be approved and then implemented.

18 We do have some areas of concern not so
19 much in the plan but as in the implementation.

20 We see a need for the cities within the
21 Integrated Communities Area to develop policies that will
22 control their growth so that it conforms with the adopted
23 Intensity Development Pattern for the year 2,000.

24 The counties which now permit development
25 in unincorporated areas so long as legal restrictions are

1 met will have to develop guidelines that conform with
2 the Section 208 Intensity Development Plan. Under the
3 nonpoint source pollution portion of the Section 208 Plan
4 urban development in currently unincorporated areas is to
5 strongly discouraged. Increased communication and coordina-
6 tion is needed between agencies, departments and local
7 governments.

8 The cities and counties should formulate
9 and adopt the same construction site practices policy so as
10 to reduce costs for developers as they try to reduce
11 sediment losses.

12 Waterworks boards should become familiar
13 with the Section 208 Plan so that their independent actions
14 enhance coherence to the Intensity Development Plan and
15 should communicate their actions to the areawide agency
16 when water lines are to be extended.

17 The Iowa Department of Transportation also
18 needs to consult with the Section 208 Plan so that highway
19 development does not encourage growth in conflict with the
20 Intensity Development Plan.

21 Existing unincorporated areas, whether with
22 or without sewer service, need aid in determining which
23 institutional practices, that would be incorporation,
24 annexation or formation of a sewer district, will best allow
25 them to assume the necessary financial obligations to

1 connect with the waste water treatment system.

2 Whatever the final form of the areawide
3 agency, it will become on more in a series of special
4 service agencies, and I refer now to the MTA, Solid Waste
5 Agency, it should have its own elected board so as to have
6 maximum responsiveness to the citizens. The fragmentation
7 of policymaking among the various local governments and
8 special service agencies may need to be addressed in the
9 near future.

10 Ordinances and policies consistent with 208
11 planning should be formulated and adopted by the local
12 governments as soon as possible to allow the 208 Plan to
13 move forward.

14 The interim areawide agency has been charged
15 with many responsibilities, including the politically
16 hazardous creation of a final areawide agency with capabil-
17 ities for controlling growth and for owning, operating and
18 financing the waste-water system. Communication and cooper-
19 ation among the cities and counties in the 208 Area is
20 essential if the goals of improved water quality in the
21 area are to be achieved.

22 Thank you.

23 HEARING OFFICER REAVIS: Thank you.

24 Our next speaker is Bryan Wadsworth, Mr.

25 Wadsworth?

1 MR. WADSWORTH: I am Bryan Wadsworth, 425
2 Main, Bondurant. And I am Mayor of Bondurant.

3 The biggest reason I am here is I spent 20
4 years in school business. People sit around and say this is
5 the way it has got to be done, you know, so we dig right in
6 and go hog wild and do it whether it was not having phonics
7 in the reading program, which they told us for years until
8 we got a bunch of dollards who could not read and found out
9 maybe English is a little phonetic. Then I remember the
10 modern math craze that made everybody so they couldn't
11 figure.

12 Now my situation is not so much the end.
13 I think all of us look down at the end of the line and say,
14 hey, we want pure water. Now this is great. It is like
15 God and motherhood, you can't oppose it. And a guy that
16 is opposing maybe what you are doing might agree with you
17 more than ever on what is to be done in the end. But he
18 might disagree with you about some of the methods of doing
19 it.

20 I think that sometimes a person has got to
21 say, all right, maybe the fellow does not want to go from
22 Bondurant to, say, Nevada to get to Ames. Maybe he wants
23 to go the other way. But he still wants to get to Ames.
24 And I think if you keep this in mind, as I go through this,
25 we will have a little agreement even though we are going to

1 have a good deal of disagreement along the way.

2 Number one, if you'll look at Bondurant up
3 here, you will notice we have a pretty large city in ground
4 and it has been that large since 1975. Now the illustrious
5 people in other towns sit around and tell us, well, hey, now
6 we ain't even gonna put no houses there. In other words,
7 it is not considered as residential area. Their map does
8 not even designate it as such. If you look at the difference
9 between the yellow and what is up above, now I wonder if--
10 are we going to put--maybe we want to save the city. All
11 right, save the city, but save it by making it good enough
12 that people will want to live in it not set up passport
13 places around the edge and have them have a passport from
14 the Mayor before they can move in, EPA, CIRALG and everybody
15 else, before they can move to an outlying community.

16 Maybe you don't look at it this way. But it
17 is that way. Because if you don't let anybody build anyplace
18 else except in Des Moines, what is it but control of where
19 people can live?

20 And I happen to have--let's see what is it--
21 13th generation of Americans in my family in this country.
22 And I don't think that this is what America is where we can
23 sit down and say, if you want to buy a house, you buy it in
24 Des Moines or in an area that's already there. I think if we
25 want to go out and build, we should go out and build. This

1 is what our ancestors did. We did not restrict them to
2 Connecticut and say the rest of it has got to be hunting
3 area for the Indians or anything like that. And I don't
4 think we should do that now.

5 But yet, in effect, this is what we are
6 doing.

7 I would like to charge EPA and all of the
8 other government agencies, DEQ and CIRALG and all the others,
9 all the other various eschelons we have, try not to impose
10 such great expenditures on cities that we have to spend so
11 doggone much money doing the paperwork and going to meetings
12 and keeping up with what the heck is going on that we don't
13 have any money left to do anything else with. And this is
14 what they are doing to us. We have got to hire 15 people
15 to do a job that five could do. Yet because of all the
16 Government's strata and so forth and so on, they make a lot
17 more work.

18 Now if they would pay us money, for instance,
19 if the EPA would come out and say, all right, Bondurant, you
20 are going to have all of this. And if you will notice
21 the difference here in the area (indicating), you see, this
22 is in our city limits, this is something that was done in
23 the past year. This is not something that was forced. This
24 is not something that Bondurant asked for. You see, this
25 is something that people in those areas wanted. It was

1 voluntary annexation, the American Way, really. It was not
2 done by edict.

3 And I think that should be residential area
4 is the schematic. We grew from 1970, a population of about
5 400 to where we are about 1,400 to 1,500 at the moment. In
6 other words, in five years, we more than tripled our growth.
7 But we stopped because we did not want any more development
8 until we knew what was going to happen with the sewer.

9 Now for the next 22 years, our growth has
10 been projected to 3,000. Now I think EPA should be inter-
11 ested in freedom of thought, in freedom of choice as well
12 as quality of water. We try to do it within the framework
13 of what people want to do and where people want to live
14 because I hope at least that we still have a free society.
15 And if we don't, God help us.

16 Now if we have some sort of a criteria for
17 water being discharged, volumes times the air and this sort
18 of thing, I think they should be set up and then I think that
19 people in the towns or wherever they may be should abide by
20 it.

21 It has been inferred that EPA, in order to
22 make this control type situation, is going to come out and
23 say to Bondurant, well, you've got to do this. But you
24 down here can get away with this because you can't help it
25 (indicating) or something like that. Now if they have a

1 criteria and a standard and it is equal and they can support
2 it in court, I think they are going to be all right. But
3 there is a tremendous ground swell of people who are start-
4 ing to look upon this as something that Hitler might have
5 done. And I sure as hell hope he is not coming here in the
6 form of anybody.

7 Thank you.

8 HEARING OFFICER REAVIS: Thank you, Mr.
9 Wadsworth.

10 That concludes, or at least completes, the
11 list of people who indicated that they wished to present
12 statements.

13 And before we go back to you, Mr. Hol, are
14 there any people here who have statements that they wish
15 to present that have not signed the list that I have?

16 Will you come forward?

17 MR. HALL: I'm Jim Hall and I'm here repre-
18 senting Pioneer Hi-Bred International. And I guess all I
19 have really is a letter that I will present you. And I
20 won't read it unless you insist.

21 HEARING OFFICER REAVIS: No, that won't be
22 necessary Mr. Hall.

23 We will enter this letter into the record
24 and it will be made a part of the proceedings.

25 (The document above-referred to

was received into the record.)

HEARING OFFICER REAVIS: Are there any other statements that anyone wishes to present at all?

(No response.)

HEARING OFFICER REAVIS: All right.

Are there any questions then?

Will you come forward, please?

MR. HOL: My name is Paul Hol. I live at 4250 Northwest 9th in Saylor Township.

I have two or three questions to ask. But first, I would like to state that I am a senior citizen and very much concerned about what the cost is going to be and what the cost is going to be to the other senior citizens that live in Saylor Township.

Now we have some very poor people that live in this area, Saylor Township, even though they are working, younger people, they are still not able to go and spend a lot of money of this. Now we have a septic tank. I would have to go approximately 75 foot to go from the road to hook on to my sewers. I paid approximately \$1,000.00 for the septic tank.

Now we was involved in a water district that cost me just--we are in the process of starting to pay for it--\$1,210.00. Now with the added cost of this, what are these elderly people supposed to do? Go into

1 nursing homes or stay in the homes the way they are and go by
2 the process that they have been able to go on in the past?

3 Now we are talking about the environment.
4 The City of Des Moines has set into the Red Rock District
5 millions of gallons of waste of raw sewage and I have heard
6 nothing that--nothing about what is being done about it.

7 Now these--somebody said that would be
8 1983 before this was started.

9 All right. In 1983, I will be 80-some years
10 old. Now living on a fixed income, my wife is on a fixed
11 income, and if anything happens to one of us, what is going
12 to happen to us to be able to pay that cost of that water
13 sewer system?

14 Now these are the things that I think some
15 of the people have not taken into consideration, under con-
16 sideration. I know that Altonna, West Des Moines and Urban-
17 dale, Clive, Carlisle, have got a problem. But I do not
18 think that we--the people of Saylor Township should be
19 compelled to join in this water think when we cannot afford
20 to do it.

21 That's all. Thank you.

22 HEARING OFFICER REAVIS: Thank you, Mr. Hall.

23 MR. WADSWORTH: If this thing had an inten-
24 sity pattern of such a nature that would prevent people
25 from going out of boundary and into Des Moines, I would

1 oppose it just as strongly. In fact, I probably own more
2 property and pay more taxes in Des Moines than I do in
3 Bondurant. But I am not anti-Des Moines, I am just anti
4 the idea.

5 I want to make that clear.

6 HEARING OFFICER REAVIS: Very well, Mr.
7 Wadsworth.

8 Does anyone have a comment or perhaps an
9 answer to the questions Mr. Hol raised?

10 You were concerned about the cost in Saylor
11 Township. I am not really sure whether anyone can really
12 address the specific subject of cost in the Plan.

13 Is there anyone who would like to address
14 it?

15 MR. WADSWORTH: I think there's a means in
16 some of those federal programs whereby those who are on
17 Social Security or other means of retirement, if it is their
18 only income, I think they do have a way that they will help
19 you or pay for it for you.

20 MR. HOL: Do you have to be below a certain
21 level?

22 MR. WADSWORTH: I don't know what the
23 specifics are, but I know there is a program.

24 MR. HOL: Yes, it is just below the level
25 of where we are.

1 MR. WADSWORTH: Just got your nose above
2 that one? O.K.

3 HEARING OFFICER REAVIS: At least you have
4 the comments that you wished to make entered into the
5 record.

6 MR. HOL: What I am trying to get at is the
7 fact that these are people of--these are older people, not
8 only ourselves, but there is a majority of people in Saylor
9 Township that are not only on the fixed income of Social
10 Security and their pension plan and things, but they are
11 also, some of them are on ADC. What is going to be the
12 help for those people?

13 HEARING OFFICER REAVIS: I appreciate the
14 problem, Mr. Hol. And I am sure others appreciate it fully
15 as well. And I am sure also that it will be addressed.
16 Certainly the comments, the questions, the statements that
17 have been presented here, all this will be considered in
18 the implementation of the 208 Plan. I want all of you to
19 be assured of that.

20 The comments, the questions, the statements
21 that you raised are not simply things that go into a record
22 to be ignored. They will be considered. They will be read
23 and considered very carefully. That's the purpose of the
24 hearing. It would be a waste of all of our time if that
25 were not true.

1 Are there any other comments, general
2 questions, that you want to raise at this time?

3 (No response.)

4 HEARING OFFICER REAVIS: If not, I want to
5 thank all of you for being here.

6 You have exercised a right that I think is
7 very, very important, very fundamental.

8 I would suspect that you are not the only
9 ones in this entire community that have comments or ques-
10 tions about this Plan. And it grieves me to think that
11 there are people that perhaps have questions that could
12 have been answered or at least their feelings put into a
13 record that will be read and considered that did not come
14 tonight.

15 And I would like to thank you and I would
16 like to congratulate you for the exercise of that right.

17 If there are no other comments or questions--
18 I might again remind you of the fact that you still can
19 offer comments on this up until June 15 and that you can
20 address any further comments that you care to make to the
21 Acting Regional Administrator of the Environmental Protection
22 Agency, Region VII, in Kansas City, Missouri.

23 MR. WADSWORTH: If we cannot afford a
24 secretary to write the notes up, would there still be
25 in the record that you people look over--will our comments

1 still be a part of the record?

2 HEARING OFFICER REAVIS: They most certainly
3 will. Everything that was said here tonight is a part of
4 the formal record that will receive very careful considera-
5 tion I guarantee you.

6 If there is nothing else, again, thank you
7 very much for coming.

8 This hearing stands adjourned.

9 (Whereupon, at 8:35 o'clock p.m.,
10 June 1, 1977, the hearing in the above-entitled
11 matter was closed.)
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C E R T I F I C A T E

I, DAVID L. ARGIE, do certify that I appeared at the time and place first hereinbefore set forth; that I took down in stenomask the entire proceedings had at said time and place, and that the foregoing thirty-six pages constitute a true, correct and complete transcript of my said stenomask notes.

David L. Argie

REPORTER

The following comment was made separately in writing.



PIONEER HI-BRED INTERNATIONAL, INC.

39<

PROPERTY PLANNING AND
DEVELOPMENT DEPARTMENT
8808 MERLE HAY ROAD
JOHNSTON, IOWA 50131
PHONE (515) 345-3810

May 31, 1977

United States Environmental Protection Agency
Region VII
1735 Baltimore
Kansas City, Missouri 64108

RE: Des Moines 208 Areawide Waste Treatment Management Plan

Gentlemen:

Pioneer Hi-Bred International is developing land within the City Limits of Johnston, which will be known as Green Meadows. This development includes a new Sewage Treatment Plant to be operated by a subsidiary of Pioneer. Service will be furnished to all residences and commercial development within Green Meadows.

The Plant construction is now 60% complete, with operation of the Plant scheduled to begin in the Fall of 1977. The capacity of the initial construction will accommodate approximately 3200 people within the development. Provisions have been made to expand the Plant approximately four times the initial size to accommodate future development.

All funding for the construction of this Plant will be through use of private money including all costs for capital expenditure, operation, and maintenance. No public funds will be used on the project.

The design of the Plant includes the activated sludge method for treating sewage. All effluent will flow directly into holding lakes until the water is needed for irrigation within the development area, or on other land owned by Pioneer Hi-Bred International. This Plant meets all design and operations standards of Iowa Department of Environmental Quality, Iowa Natural Resources Council, and the City of Johnston. No pollution will be directed into Beaver Creek or the related Flood Plains.

We object to any requirement as a part of the 208 Program, which would require us to phase out our plant. This is a Plant which meets all environmental standards. The holding lakes will be used as recreational facilities. The Plant does not draw from public funds and will remain a

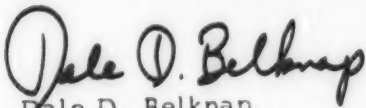
United States Environmental Protection Agency
May 31, 1977
Page 2

a tax producing entity throughout its operation. Integration of this facility into your program should be considered an asset.

We feel the information contained in this letter will be of value for your continued planning of the 208 Program. Your response to our letter will be appreciated.

Sincerely,

PROPERTY PLANNING & DEVELOPMENT

A handwritten signature in dark ink, reading "Dale D. Belknap". The signature is written in a cursive style with a large, looped initial "D".

Dale D. Belknap
Project Manager

DDB/ps

Response to Comments Made at the Public Hearing

Response to comments presented by Mr. Ferro on behalf of CIRALG: We understand the comments to be consistent with the proposed 208 plan.

Response to comments made by Ms. Williams: We understand the comments to be consistent with the proposed 208 plan.

Response to comments made by Ms. Staples: We acknowledge the comment supporting the plan and note areas of concern raised by Ms. Staples regarding implementation. Each of these areas was addressed in the planning process, and we believe that the plan as presently formulated directs and/or enables appropriate agencies to deal with the potential problems discussed by Ms. Staples.

Response to comments made by Mr. Wadsworth: One of the starting points in the 208 planning process was the development of the Intensity Development Pattern (IDP) to which Mr. Wadsworth refers. This Pattern is based on the comprehensive plans prepared by cities in the 208 study area, on water quality goals established by participants in the planning process, on goals affecting the preservation of agricultural land and other natural resources and on areawide growth patterns. All these elements and their relationship to the IDP were fully discussed by the Land Use and Policy Committees during the early stages of 208 planning. The IDP was unanimously endorsed by these committees. We feel that the process used to arrive at the IDP was comprehensive and fair. We also acknowledge that it is not perfect and will require periodic review and possible adjustment in the future based on realized growth patterns and achievement of water quality and related goals.

Response to comments presented in the form of a letter from Pioneer Hi-Bred International, Inc. by Mr. Belknap: Integration of sewage effluent from the Green Meadows development into the areawide collection and treatment system was based on discussion and agreement between Pioneer Hi-Bred International, Inc. and Iowa Department of Environmental Quality. This agreement was expressed in correspondence between DEQ and Pioneer Hi-Bred prior to the granting of the facility construction permit, and it was expressed in a letter from Pioneer Hi-Bred to CIRALG dated August 27, 1975, which included the statement, "It is our hope and intention that Pioneer will cease operating this facility for sewage treatment as soon as treatment is available by the City of Johnston or a metropolitan agency." It is the position of DEQ that regional water quality goals can best be met by minimizing the number of effluent discharge points.

Response to comments made by Mr. Hol: One objective throughout the entire planning process was to develop a plan which was effective but affordable for those who would use it. We recognize that almost any scheme for cost distribution may be unfair or at least difficult for some individuals. Practical solutions to this problem were explored and should continue to be explored during the implementation phase of the plan.

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GLOSSARY

Activated Sludge - generally refers to the sewage treatment process by which biologically active sludge is mixed with raw, incoming sewage in the presence of air or oxygen.

Aerobic - living or acting in the presence of air or oxygen.

Anerobic - living or acting in the absence of air or oxygen.

Areawide Wastewater Agency (AWA) - the Agency in the proposed Areawide Wastewater Management Plan which would have responsibility for managing areawide treatment facilities and coordinating local facilities as needed and described in the plan.

Best Management Practices (BMP) - those practices that are determined by a State (or areawide planning agency) after appropriate studies to be the most effective, practicable means of preventing or reducing pollution from non-point sources to levels compatible with specified water quality goals.

Best Practicable Waste Treatment Technology (BPWTT) - the level of municipal sewage treatment which is to be achieved by July 1, 1983, based on a careful review of alternative advanced treatment processes and systems including consideration of treatment and reuse of wastewater, spray irrigation or other land disposal as well as the more conventional treatment and discharge to receiving waters. This standard is based on the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) Section 201(b).

Biological Process - the process of breaking down large, complex organic molecules in sewage into simple, inorganic molecules by the action of biological organisms (bacteria, fungi, microscopic invertebrates).

Breakpoint Chlorination - chlorination of wastewater to the extent that all of the ammonia is converted to trichloramine or oxidized to nitrogen gas or other gases.

Combined Sewer - a sewer which carries both sanitary sewage and surface runoff from rainfall or snow melt.

Cost-Effective Analysis - economic analysis of a program or project which shows the anticipated costs of that project in relation to its effectiveness or level of goal attainment.

Dissolved Oxygen - the quantity of dissolved or freely available oxygen in a specified volume of water. An important indicator of water quality.

Easement - the right of one person or group to use land owned by another for specified purposes.

Efficiency - the measure of work done in relation to the energy supplied; inversely related to waste.

Effluent - a fluid discharged from a facility or natural system.

Flood Plain - land bordering a river or stream which periodically floods the land.

Flow-Equalization Basins - basins which temporarily contain excess wastewater flow from sewer systems for later discharge and treatment.

Force Main - a pipe which carries waste water under pressure, i.e., it carries pumped sewage.

Infiltration - flow of a fluid into a material or a system through pores or small openings. Used both in relation to "infiltration" of surface water into the soil and to "infiltration" of surface or ground water into cracks, defective joints, etc., in a sewer system.

Infiltration/Inflow (I/I) - the combined entry of water into a sewer system through infiltration and service connections.

Inflow - entry of water into a sewer system through service connections.

Integrated Community Area - that part of the Des Moines 208 study area which includes the City of Des Moines and adjacent or near community areas but not including more distant outlying community areas.

Intensity Development Pattern - the pattern of anticipated growth in the Des Moines 208 study area based on the comprehensive plans of individual governmental units, projected to the year 2000.

Intermittent Point Source - a non-constant source of waste water flow in the sewer system, principally storm water runoff entering either storm or combined sewers.

Land Application - the placement of liquid or solid waste materials on land for the purpose of waste disposal, land fertilization and conditioning, or both.

Lift Station - an installation of two or more pumps in a sewer system at which sewage is pumped to a higher elevation for subsequent gravity or pumped flow.

Nitrification - the conversion of ammonia to nitrites (which do not generally accumulate) and nitrates, usually by micro-organisms. Occurs both in waste treatment systems and in soil.

Nonpoint Source - a source of pollution which discharges in a diffuse manner over a land area sufficiently large so as to make collection difficult or impossible, such as runoff from agricultural land areas, seepage from mines or spoil mounds, sediment discharge during construction, etc.

Outfall Sewer - a sewer which discharges treated waste water to the receiving stream. (May also be used for a sewer which conveys sewage to the treatment facility.)

Physical-chemical Process - a sewage treatment process using chemical, mechanical or other non-biological methods.

Point Source - a source of pollution which discharges in one or a manageable number of locations, such as in municipal sewage treatment plants, combined sewer overflows, industrial waste water discharges, etc. (See also nonpoint source in this glossary.)

Population Equivalent - an expression for the amount of organic material in a specified volume of sewage in terms of the number of people required under normal conditions to produce that amount.

Potable Water - water suitable for drinking or cooking purposes, both from health and aesthetic considerations.

Primary Treatment - the first stage of sewage treatment in which most floating or settleable solids are removed mechanically by screening and sedimentation.

Sanitary Sewer - a sewer that carries domestic or commercial sewage.

Satellite Cities - those cities in the Des Moines 208 study area which are located more than several miles from the City of Des Moines and adjacent and near communities (Integrated Community Area).

Secondary Impacts - those impacts which act through an intermediate factor or factors. For example, improved water quality through more effective sewage treatment may improve conditions for fish and other aquatic wildlife, which may have the secondary impact of improving recreational opportunities along the receiving stream.

Secondary Treatment - sewage treatment beyond primary treatment (defined in this Glossary) in which bacteria and other micro-organisms decompose organic materials carried in the sewage.

Septic Tank - an underground tank used to deposit domestic wastes. Much of the solid contents settle and accumulate in the bottom, bacteria and other micro-organisms decompose organic materials, and partially treated effluent is discharged - generally to a soil infiltration bed via porous piping. Accumulated sludge must be removed periodically.

Sewer Segregation - the provision of separate trunk sewers for sanitary and for combined sewage. Sanitary sewage can be given highest priority at the treatment facility, and combined sewage can be treated as capacity allows.

Sewer System Evaluation Survey (SSES) - a systematic examination of a sewer system to locate all infiltration and inflow sources. It is performed on those systems considered to have excessive infiltration/inflow and is done to arrive at a decision to repair the system or provide capacity to treat the excess flows.

Sewer Separation - the removal of storm sewer inlets to a combined system and the provision of separate storm sewers throughout a service area.

Storm Sewer - a sewer that carries storm runoff or snow melt and does not carry sanitary sewage.

Storm Water Management Model (SWMM) - a comprehensive mathematical model capable of representing stormwater runoff and predicting quality and quantity of flows generated, within the limits of input data accuracy and precision of the model itself.

Tertiary Treatment - treatment which generally follows secondary treatment (defined in this glossary) and may utilize a wide variety of techniques depending on the pollutants still present and on water quality objectives.

Total Kjeldahl Nitrogen - nitrogen which is present either as ammonia or in organic compounds in a sample. Does not include nitrite and nitrate (oxidized) forms.

Trickling Filter - a bed of coarse rock or other medium over which sewage is sprayed for biological (secondary) treatment. Bacteria lodged in the seum adhering to the rock breaks down organic matter in the sewage.

Urban Runoff - surface water flow generated during storms or from snow melt in urban areas.

Zoning - the designation of land areas for specified uses or classes of use.

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Table A-1a

CHARACTERISTICS OF COMPONENT SOILS IN GENERAL
SOIL AREA # 1

	<u>Clarion Loam</u>	<u>Nicollet Loam</u>	<u>Silty Clay Webster Loam</u>
Color	Dark Brown	Dark Brown	Dark Brown
Parent Material:	Glacial Till	Glacial Till	Glacial Till & Sediments
Native Veg.:	Prairie	Prairie	Prairie
Typical Slope (%):	2-9	1-3	0-2
Landscape Position:	Upland	Upland Intermediate Highs	Upland Flats & Swales
Drainage Class:	Well Drained	Somewhat Poorly Drained	Poorly Drained
Permeability:	Moderate	Moderate	Moderately Slow to Moderate
Depth to Water Table (feet):	> 5	2-4	1-3
Available Water Capacity:	High	High	High
Flooding Potential:	Produces Run- off	Produces Slow Runoff	Produces Slow Runoff
Corn Suitability Rating (max.):	87	90	85
Soil Loss Factors (T,K):	4,0.32	4,0.32	-

Table A-1b

CHARACTERISTICS OF COMPONENT SOILS IN GENERAL
SOIL AREA # 2

	<u>Hayden Loam</u>	<u>Lester Loam</u>
Color:	Light	Moderately Dark
Parent Material:	Glacial Till	Glacial Till
Native Veg.:	Forest	Prairie and Forest
Typical Slope (%):	2-25	2-25
Landscape Position:	Upland Ridges & Side Slopes	Upland Ridges & Side Slopes
Drainage Class:	Well Drained	Well Drained
Permeability:	Moderate	Moderate
Depth to Water Table (feet):	> 5	>5
Available Water Capacity:	High	High
Flooding Potential:	Produces Runoff	Produces Runoff
Corn Suitability Rating (Max.):	72	77
Soil Loss Factors (T,K):	4,0.37	4,0.32

Table A-1c

CHARACTERISTICS OF COMPONENT SOILS IN GENERAL
SOIL AREA # 3

	<u>Colo Silty Clay Loam</u>	<u>Waukegan Silt Loam</u>	<u>Dickinson Fine Sandy Loam</u>	<u>Dorchester Silt Loam</u>
Color:	Dark	Dark	Dark	Light to Moderately Dark
Parent Material:	Alluvium	Silty Alluvium over Sand with Little Gravel	Dominantly Aeolian Sand	Calcareous Alluvium
Native Veg.:	Prairie	Prairie	Prairie	Grass & Scattered Trees
Typical Slope (%):	0-2	1-5	2-9	0-1
Landscape Position:	First Bottomland, Foot-slopes	Downstream Terrace & Glacial Outwash Plains	Uplands & Stream Terraces	Bottomland
Drainage Class:	Poorly Drained	Well Drained	Somewhat Excessively Drained	Well to Moderately Well Drained
Permeability:	Moderate-Slow	Moderate (Upper 24-40"), Rapid Below	Moderately Rapid	Moderate
Depth to Water Table (feet):	1-3	> 5	>10	Generally Below 5
Available Water Capacity:	High	Moderate	Low	High
Flooding Potential:	Subject to Standing Water	Produces Runoff	Produces Runoff	Frequent Floods of Short Duration
Corn Suitability Rating (Max.):	80	73	60	85
Soil Loss Factors (T, K):	-	3,0.32	-	-

Table A-1d
 CHARACTERISTICS OF COMPONENT SOILS IN GENERAL
 SOIL AREA # 4

	<u>Fayette Silt Loam</u>	<u>Downs Silt Loam</u>
Color:	Light	Moderate-dark
Parent Material:	Loess	Loess
Native Veg.:	Forest	Prairie and Forest
Typical Slope (%):	2-5	2-5
Landscape Position:	Upland ridges and sideslopes	Upland ridges and sideslopes
Drainage Class:	Well drained	Well drained
Permeability:	Moderate	Moderate
Depth to Water Table (feet):	> 5	> 5
Available Water Capacity:	High	High
Flooding Potential:	Produces runoff	Produces runoff
Corn Suitability Rating (Max.):	85	90
Soil Loss Factors (T,K):	4,0.37	4,0.32

Table A-1e

CHARACTERISTICS OF COMPONENT SOILS IN GENERAL
SOIL AREA # 4a

	<u>Ladoga Silt Loam</u>	<u>Lindley Loam</u>
Color:	Moderate-dark	Light
Parent Material:	Loess	Loamy Glacial Till
Native Veg.:	Prairie-forest	Forest
Typical Slope (%):	2-5	14-25
Landscape Position:	Convex upland ridges and sideslopes and stream benches	Dissected uplands, sideslopes and narrow ridgetops
Drainage Class:	Moderate-well drained	Moderate-well drained
Permeability:	Moderate-slow	Moderate-slow
Depth to Water Table (feet):	> 5	> 5
Available Water Capacity:	High	High
Flooding Potential:	Produces medium runoff; bench phases receive surface water from higher areas	Produces rapid runoff
Corn Suitability Rating (max.):	85	50
Soil Loss Factors (T,K):	4,0.37	3,0.43

Table A-1f

CHARACTERISTICS OF COMPONENT SOILS IN GENERAL
SOIL AREA # 5

	<u>Tama Silty Clay Loam</u>	<u>Muscatine Silty Clay Loam</u>
Color:	Dark Brown (yellow-brown subst.)	Dark
Parent Material:	Loess	Loess
Native Veg.:	Prairie	Prairie
Typical Slope (%):	2-9	1-3
Landscape Position:	Upland Ridges and Sideslopes	Upland Ridges and some Footslopes
Drainage Class:	Well Drained	Somewhat Poorly Drained
Permeability:	Moderate	Moderate
Depth to Water Table (feet):	> 5	2-4
Available Water Capacity:	High	High
Flooding Potential:	Produces Runoff	Produces Runoff, Low Spots may Pond
Corn Suitability Rating (max.):	95	100
Soil Loss Factors (T,K):	5,0.32	5,0.32

Table A-1g
 CHARACTERISTICS OF COMPONENT SOILS IN GENERAL
 SOIL AREA # 5a

	<u>Sharpsburg Silty Clay Loam</u>	<u>Shelby Loam</u>
Color:	Dark	Dark
Parent Material:	Loess	Glacial Till
Native Veg.:	Prairie	Prairie
Typical Slope (%):	2-9	9-18
Landscape Position:	Upland divides, convex ridgetops and sideslopes	Upland sideslopes and narrow ridgetops
Drainage Class:	Moderately Well Drained	Well to Moderately Well Drained
Permeability:	Moderate-slow	Moderate-slow
Depth to Water Table (feet):	> 5	5-10
Available Water Capacity:	High	High
Flooding Potential:	Produces medium to rapid runoff	Produces rapid runoff
Corn Suitability Rating (max.):	92	60
Soil Loss Factors (T,K):	4,0.37	4,0.37

Table A-1h
 CHARACTERISTICS OF COMPONENT SOILS IN GENERAL
 SOIL AREA # 6

	<u>Sparta Loamy Fine Sand</u>	<u>Farrar Fine Sandy Loam</u>	<u>Chelsea Loamy Fine Sand</u>
Color:	Moderate-dark brown	Dark Brown	Dark Grey-brons (yellow subs.)
Parent Material:	Aeolian Sands	Aeolian Sands Over Glacial Till	Aeolian Sands
Native Veg.:	Prairie		Forest
Typical Slope (%):	3-14		5-20
Landscape Po- sition:	Upland Stream Terrace		Upland Stream Terrace
Drainage Class:	Excessively Drained	Somewhat Excessively Drained	Excessively Drained
Permeability	Very Rapid		Rapid
Depth to Water Table (feet):	> 10	> 5	> 10
Available Water Capacity	Very Low		Very Low
Flooding Po- tential:	Produces Runoff		Produces Runoff
Corn Suitability Rating (max.):	45		41
Soil Loss Factors (T, K):	5,0.17		5,0.17

B-1

APPENDIX B

INTERIM LIST OF ENDANGERED SPECIES - IOWA

Vascular Plants

<u>Latin Binomial</u>	<u>Family</u>	<u>Common Name</u>
* <i>Aconitum novaboracense</i>	Ranunculaceae	Monkshood
<i>Agastache foeniculum</i>	Labiatae	None
<i>Allium cernuum</i>	Liliaceae	Nodding wild onion
<i>Amorpha nana</i>	Leguminosae	Fragrant false indigo
<i>Arctostaphylos uva-ursi</i>	Ericaceae	Bearberry
<i>Asclepias languinosa</i>	Asclepiaceae	None
* <i>Asclepias meadii</i>	Asclepiaceae	Mead's milkweed
<i>Asclepias auriculata</i>	Asclepiaceae	None
<i>Astragalus striatus</i>	Leguminosae	None
<i>Bidens beckii</i>	Compositae	Water marigold
<i>Botrychium multifidum</i>	Ophioglossaceae	Leather grape fern
<i>Botrychium simplex</i>	Ophioglossaceae	Least grape fern
<i>Buchloe dactyloides</i>	Gramineae	Buffalo grass
<i>Brasenia schreberi</i>	Nymphaeaceae	Water shield
<i>Carex aggregata</i>	Cyperaceae	None
<i>Carex crawfordii</i>	Cyperaceae	None
<i>Carex leptalea</i>	Cyperaceae	None
<i>Carex media</i>	Cyperaceae	None
<i>Carex saximontana</i>	Cyperaceae	None
<i>Carex tomsa</i>	Cyperaceae	None
<i>Cerastium arvense</i>	Caryophyllaceae	Field chickweed
<i>Chimaphila umbellata</i>	Ericaceae	Prince's pine
<i>Chrysosplenium ioense</i>	Saxifragaceae	Golden saxifrage
<i>Cornus canadensis</i>	Cornaceae	Dwarf cornel
<i>Corydalis aruca</i>	Papavaraceae	None
<i>Cristatella jamesii</i>	Capparidaceae	None
<i>Cypripedium candidum</i>	Orchidaceae	Small white ladyslipper
<i>Cypripedium reginae</i>	Orchidaceae	Shown lady-slipper
<i>Decodon verticillata</i>	Lythraceae	Water willow
<i>Drosera rotundifolia</i>	Droseraceae	Sundew
<i>Dryopteris marginalis</i>	Aspleniaceae	Marginal shield fern
<i>Dryopteris intermedia</i>	Aspleniaceae	
<i>Elatine triandra</i>	Elatinaceae	None
<i>Eleocharis coloradoensis</i>	Cyperaceae	None
<i>Eleocharis atropurpurea</i>	Cyperaceae	None
<i>Equisetum scirpoides</i>	Equisetaceae	Dwarf scouring rush
<i>E. sylvaticum</i>	Equisetaceae	
<i>E. pratense</i>	Equisetaceae	None
<i>Eriophorum angustifolium</i>	Cyperaceae	Bog cotton

*Federal 'endangered' (proposed) list

<u>Latin Binomial</u>	<u>Family</u>	<u>Common Name</u>
<i>E. gracile</i>	Cyperaceae	Slender cotton grass
<i>Fimbristylis autumnalis</i>	Cyperaceae	None
<i>Gerardia gattingeri</i>	Scrophulariaceae	None
<i>Gerardia skinneriana</i>	Scrophulariaceae	None
<i>Habenaria flava</i> var. <i>herbiola</i>	Orchidaceae	Pale green orchid
<i>Heteranthera limosa</i>	Pontederiaceae	
<i>Hudsonia tomentosa</i>	Cistaceae	Poverty grass
<i>Hybanthus concolor</i>	Violaceae	Green violet
<i>Hypericum boreale</i>	Hypericaceae	St. John's wort
<i>Ilex verticillata</i>	Aquifoliaceae	Winterberry
<i>Jeffersonia diphylla</i>	Berberidaceae	Twin-leaf
<i>Juncus alpinus</i>	Juncaceae	None
<i>Juncus greenii</i>	Juncaceae	
<i>Justicia americana</i>	Acanthaceae	Water-willow
<i>Lechea intermedia</i>	Cistaceae	
* <i>Lespedeza leptostachya</i>	Leguminosae	Prairie bush clover
<i>Linnaea borealis</i>	Caprifoliaceae	Twinflower
<i>Lycopodium clavatum</i>	Lycopodiaceae	
<i>Lycopodium flabelliforme</i>	Lycopodiaceae	
<i>Lycopodium porophyllum</i>	Lycopodiaceae	
<i>Menyanthes trifoliata</i>	Menyanthaceae	Bog buckbean
<i>Mertensia paniculata</i>	Boraginaceae	Northern lungwort
<i>Mitchella repens</i>	Rubiaceae	partridge berry
<i>Myriophyllum pinnatum</i>	Haloragaceae	
<i>Ophioglossum pseudopodium</i>	Ophioglossaceae	Adder's tongue fern
<i>Oryzopsis pungens</i>	Gramineae	
<i>Osmunda cinnamomea</i>	Osmundaceae	Cinnamon fern
<i>Osmunda regalis</i>	Osmundaceae	Royal fern
<i>Panicum linearifolium</i>	Gramineae	
<i>Peltranara virginica</i>	Araceae	Arrow arum
<i>Petalostemum villosum</i>	Leguminosae	Silky prairie clover
<i>Polygala incarnata</i>	Polygalaceae	
<i>P. polygame</i>	Polygalaceae	
<i>Poa languida</i>	Gramineae	
<i>Proserpinaca palustris</i>	Haloragaceae	mermaid weed
<i>Pyrola secunda</i>	Ericaceae	Shinleaf
<i>Rhexia virginica</i>	melastomataceae	Meadow beauty
<i>Ribes hudsonianum</i>	Saxifragaceae	
<i>Salix lucida</i>	Salicaceae	Shining willow
<i>Salix pedicellaris</i>	Salicaceae	Bog willow
<i>Schedonnardus paniculatus</i>	Gramineae	
<i>Scirpus paludosus</i>	Cyperaceae	
<i>Talinum parviflorum</i>	Portulacaceae	Fame flower
<i>T. rugospermum</i>	Portulacaceae	
<i>Utricula gibba</i>	Lentibualriaceae	
<i>U. minor</i>	Lentibualriaceae	

*Federal 'endangered' (proposed) list

B-3

Latin BinomialFamilyCommon Name

Vaccinium angustifolium
 V. myrtilloides
 Vailisneria americana
 Veronica americana
 Woodsia oregana
 W. ilvinsis

Ericaceae
 Ericaceae
 Hydrocharitaceae
 Scrophulariaceae
 Aspleniaceae
 Aspleniaceae

Low sweet blueberry
 Velvet-leaf blueberry
 Tapegrass

 Western cliff fern
 Rusty cliff fern

BirdsCommon Name

Red-shouldered Hawk
 Marsh Hawk (Harrier)
 Piping Plover
 Upland Sandpiper
 Barn Owl
 Least Tern

Buteo lineatus
 Circus cyaneus
 Charadrius melodus
 Bartramia longicauda
 Tyto alba
 Sterna albifrons

MammalsCommon Name

Pygmy shrew
 *Indiana Bat
 Plains Pocket Mouse
 Grasshopper Mouse
 Red-backed Vole
 Woodland Vole
 Ermine (short-tailed weasel)
 Bobcat

Reptiles and AmphibiansCommon Name

Illinois mud turtle
 Wood turtle
 Great plains skink
 Western Slender Glass Lizard
 Speckled Kingsnake
 Northern Copperhead
 Prairie Rattlesnake
 Central Newt

*Federal 'endangered' (proposed) list

60<

B-4

Fish

Common Name

Pallid sturgeon
Lake chub
Blacknose Shiner
Pearl Dace
Black Redhorse
Plains Topminnow
Longear Sunfish
Orangethroat Darter

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

61<

CENTRAL REGION
601 EAST 12TH STREET
KANSAS CITY, MISSOURI 64106



MAY 5 1977

Mr. Charles V. Wright
U. S. Environmental Protection Agency
1735 Baltimore - Region VII
Kansas City, Missouri 64108

Subj: Draft EIS - Des Moines 208 Areawide Waste Treatment Management Plan

Dear Mr. Wright:

We have reviewed the subject draft and while we have no comment concerning the environmental impact of the proposal, we would like to express our concern of the possible impact of construction on some of our facilities.

We can, in general, express concern that large machinery or disruption of the earth's surface, especially mounding, near some of our electronic aids such as VOR, ILS, and radar will cause them to be unreliable. Loss of these aids could create unsafe conditions.

Also, it has been our experience that digging near many of our facilities can result in loss of power and control cables from cutting. When this happens to critical facilities such as radar and communications, near panic situations can develop.

Since we were unable to determine where such work may be taking place, we would like assurance that the proposed construction will not take place close to any of our facilities. If this is not possible, the facilities should be identified and FAA given the opportunity to work with CIRALG to minimize any adverse effects of construction.

Thank you for the opportunity to comment.

Sincerely,

James H. King
JAMES H. KING
Chief, Planning and Appraisal Staff

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION SEVEN

P. O. Box 19715
Kansas City, Missouri 64141

May 12, 1977

IN REPLY REFER TO:

HED-07

Mr. Charles V. Wright
Acting Regional Administrator
U.S. Environmental Protection Agency
1735 Baltimore
Kansas City, Missouri 64108

Dear Mr. Wright:

The Draft Environmental Impact Statement for the Des Moines 208 Areawide Waste Treatment Management Plan has been reviewed and we have the following comments:

The EIS mentions on page V-15 that 208 study area considerations for the proposed freeways (Routes 500 and 592) were not included in this Draft EIS because completion was not likely prior to the year 2000. Although these two freeways are not in the Iowa DOT's current five-year plan, portions of these freeways will probably be completed by the year 2000. The Final EIS should address impacts or anticipated impacts related to these transportation improvements and associated development.

Sincerely yours,


Steiner M. Silence
Director, Office of Environment & Design



United States Department of the Interior

63<

OFFICE OF THE SECRETARY

~~WASHINGTON, D.C. 20010~~

MISSOURI BASIN REGION
DENVER, COLORADO 80225

In Reply Refer To:
ER-77/373

JUN 3 1977

Mr. Charles V. Wright
Acting Regional Administrator
U.S. Environmental Protection Agency
1735 Baltimore Avenue
Kansas City, Missouri 64108

RECEIVED

1977
WATER QUALITY PLANNING
WATER DIVISION

Dear Mr. Wright:

We have reviewed the draft environmental statement for the 208 Areawide Waste Treatment Management Plan for Des Moines, Iowa.

General Comments

Neither the maps nor the text in the document provide sufficient information to determine the precise location of the proposed facilities and, therefore, their impacts on recreational, cultural, and mineral resources. We recognize that specific sites for all of the structures have not been determined; however, where such sites are known, as in the case of the enlargement of existing lagoons, we recommend that maps of larger scale and a revised text be employed in the final environmental statement to describe the geographical location and its immediate surroundings. Where precise construction locations are not presently known, adequate maps and textual description must be included in the subsequent site-specific environmental documents.

Comment 1

Comment 2

Recreational Resources

Three areas were identified within the document as being sites of possible conflict between recreational use and projected construction. The planned enlargement of the existing lagoon near Granger is described as being a "hazard" to an upstream wetland area presently utilized by hunters and other recreationists. In Des Moines, two equalization basins, described as sizeable physical structures rising as much as 10 to 15 feet above the ground, are planned for Prospect Park and another proposed neighborhood park near County Line Road and Fleur Drive. It

Comment 3



Save Energy and You Serve America!

is stated that conflicts caused by construction of the equalization basins "could be resolved by basin design and placement which would minimize or prevent any interference with recreational land uses. In fact, the basin surface may itself serve as a recreation area, for example, tennis courts." We believe that the mitigation of construction impacts on recreation should be addressed directly and should avoid phrases like "could be resolved" or "may serve." The final statement should set forth specific mitigation measures which will be carried out as part of the construction projects. Furthermore, the loss of recreation land to construction of these and other structures should be quantified for each structure as far as practicable.

There may be other conflicts with recreation lands within the study area which cannot be ascertained without larger scale maps and more detailed text. The equalization basin planned for the proposed neighborhood park in the vicinity of Fleur Drive and County Line Road is near Fort Des Moines. Three tracts of this federally owned property, totalling 244.27 acres, have been conveyed to the Polk County Conservation Board (2 parcels) and the City of Des Moines Department of Parks (1 parcel) for park and recreation purposes. This was accomplished under the provisions of the Surplus Property Act of 1944 (58 Stat. 770), as amended, and the Federal Property and Administrative Services Act of 1949 (63 Stat. 377), as amended. The provisions of the Instrument of Transfer specify that the property shall not be sold, leased, or otherwise disposed of except with the consent of the Secretary of the Interior. Substitution of properties of at least equal fair market value and reasonably equivalent usefulness and location for the recreational lands to be taken would be required.

Comment 3

In addition, the outlying communities of Alleman, Mitchellville, Norwalk, and Carlisle have recreation areas which have received matching assistance monies from the Land and Water Conservation Fund (L&WCF). In the Des Moines metropolitan area, numerous projects have also received such funding. The following recreation resources in the metropolitan area may be of particular interest in the preparation of future documents: (1) the Des Moines Riverfront Bikeway, a Federal Highway Administration Bikeway Demonstration Project; (2) a bikeway between McKenry and Union Parks, partially funded through L&WCF monies; and (3) the proposed Des Moines River. Any temporary or permanent disruption of parklands, including but not limited to the above, and appropriate mitigation, should be addressed in subsequent documents.

Comment 4

Encroachments on properties that have received L&WCF assistance would constitute a conversion of recreation use under Section 6(f) of the Land and Water Conservation Fund Act, as amended. Section 6(f) requires that any change from recreational land use be approved by the

Comment 5

Secretary of the Interior and also requires the substitution of other properties of at least equal fair market value and reasonably equivalent usefulness and location for the recreation lands to be taken. There is no provision under this section for acceptance of cash in payment for recreation lands converted to other uses. Any request for approval should be initiated by local park agencies through Mr. Fred A. Prievert, Director, Iowa Conservation Commission, 300 Fourth Street, Des Moines, Iowa 50319. Since Mr. Prievert has responsibility for administration of the Land and Water Conservation Fund in Iowa, he would be the official to contact for further information regarding specific fund-assisted parks.

Comment 5

We concur that the plan will indirectly benefit recreation through the improvement of water quality, but suggest that more direct benefits could be incorporated into the plan. It would be possible, for example, to acquire and develop lands adjacent to proposed construction sites which could serve both as buffers and as recreational resources in their own right. Another possibility would be to incorporate bikeways or trails on the rights-of-way of sewer trunk-line construction, especially since these will follow stream valleys in most instances. Technical assistance for including recreation planning in the areawide 208 plan is available from the Bureau of Outdoor Recreation, Mid-Continent Region, P.O. Box 25387, Denver Federal Center, Denver, Colorado 80225.

Comment 6

Cultural Resources

A national historic landmark, the Fort Des Moines Provisional Army Officer Training School, appears to be located close to the proposed facilities near the Warren-Polk County line. We have enclosed a boundary map of the landmark for your information.

Comment 7

We note that you are working with the State Historical Department in assessing impacts of the undertaking on cultural resources (p. V-37). It is not clear whether the State Historic Preservation Officer (Mr. Adrian Anderson, B-13 MacLean Hall, Iowa City, Iowa 52242) has also been consulted. His participation is required by the Advisory Council on Historic Preservation's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR 800). The results of the proposed "surveys, intensive investigations, and procedures for mitigating adverse impacts" should be in accordance with the Council's "Procedures" and, along with pertinent documentation, included in the final statement.

Comment 8

The final statement should also reflect procedures to be followed if previously unknown archeological resources are encountered during project development.

Comment 9

Wildlife Resources

The statement adequately addresses impacts on fish and wildlife resources and the related natural environment. The plan is a big step in the right direction and we endorse it wholeheartedly.

Comment 10

Water Resources

Although one of the primary objectives of the intended sewage disposal system is to prevent increasing contamination of waterways, reservoirs, and aquifers, there are no illustrations in the report that clearly show the drainage pattern or the location of the dams. For a better understanding of their interrelationship, a correlation is required for the drainage basins, aquifers, waterways, and reservoir locations. A statement giving the capacity of the main reservoirs also would be helpful.

Comment 11

We suggest that more specific baseline data on streamflow characteristics of the Des Moines River and its principal tributaries should be obtained. Such data would be useful in evaluating amelioration of hazardous concentrations of pollutants in the river, especially during low flows.

Among the strict specifications to protect ground water, such as those discussed on pages VI-3 and VI-4, linings should be included where lagoons must overlies alluvium or other appreciably permeable materials; downgradient monitoring of ground water should also be standard practice for such situations.

Mineral Resources

Large volumes of both excavation and fill would be required in constructing lift stations, some 13 equalization basins that have capacities up to 7.72 million gallons, and 9 treatment facilities, plus a regional treatment facility. Moreover, grade stabilization structures and terraces, estimated to cost \$50 million, also would require fill or excavation as would many miles of trunklines. The source of fill material and the area for disposal should be mentioned in the text.

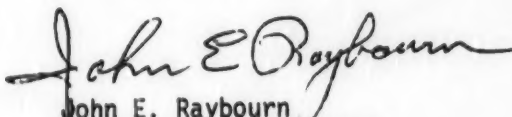
Comment 12

In the final statement, the section on geology should include summary results of the statewide inventory of coal resources and the impacts on coal in the area if minable reserves are indicated. Further, the text should state whether the underground liquid petroleum gas storage is being utilized now and whether its future use would be impaired if the proposed project is constructed.

The coverage on geology does not mention occurrences of building stone, sand and gravel, limestone, road rock, or other minerals that normally are mined near densely populated areas such as Des Moines. Closure or curtailment of any such enterprise would cause environmental changes requiring evaluation in the study.

Comment 12

Sincerely,



John E. Raybourn
Regional Environmental
Review Officer

Enclosure





69<

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGION VII
FEDERAL BUILDING
601 EAST 12TH STREET
KANSAS CITY, MISSOURI 64108

OFFICE OF
THE REGIONAL DIRECTOR

June 9, 1977

Mr. Charles V. Wright
Acting Regional Administrator
United States Environmental Protection Agency
1735 Baltimore
Kansas City, Missouri 64108

Re: DEIS Des Moines 208 Areawide Waste Treatment
Management Plan, Des Moines, Iowa

Dear Mr. Wright:

We have reviewed the above referenced project and appreciate
the opportunity to comment.

This project has no apparent impact on the program of the
Department of Health, Education, and Welfare. Further, it would
appear that the impacts of the proposed action and the reasonable
alternatives have been adequately addressed.

Sincerely,

William H. Henderson
William H. Henderson
Regional Environmental Officer



DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING
ROCK ISLAND, ILLINOIS 61201

IN REPLY REFER TO

NCRED-PB

2 JUN 1977

Mr. Charles V. Wright
Acting Regional Administrator
EPA, Region VII
1735 Baltimore
Kansas City, Missouri 64108

Dear Mr. Wright:

This office has reviewed the draft environmental statement for Des Moines 208 Areawide Waste Treatment Management Plan. The only comment this office has at this time concerns Department of the Army permit authorizations. Future coordination is desired when individual implementation of the proposed actions is taken.

Portions of the proposed plan will require Section 10 and/or Section 404 permits. The draft statement does not address these actions. A discussion of the impacts anticipated in relationship to these requirements should be incorporated in the final statement. I recommend that you contact Mr. Monte Hines, Permits and Statistics Branch, for direct coordination in determining the permit requirements.

Comment

Sincerely yours,

DOYLE W. McCULLY
Chief, Engineering Division

UNITED STATES DEPARTMENT OF AGRICULTURE

71<

SOIL CONSERVATION SERVICE

693 Federal Building, Des Moines, IA 50309

June 21, 1977

Mr. Charles V. Wright
Acting Regional Administrator
Environmental Protection Agency
Region VII, 1735 Baltimore
Kansas City, Missouri 64104

Dear Mr. Wright:

The draft environmental impact statement for the Des Moines 20th Area-wide Waste Treatment Plan, March 1977, was referred to the Soil Conservation Service for review and comment.

We have reviewed the statement and have no comments at this time. The statement covers the point and non-point sources of pollution very well.

The Soil Conservation Service, through the soil conservation districts in Polk, Warren, Dallas and Jasper Counties, have participated in the study and would be happy to continue to furnish assistance to this proposed project.

We appreciate the opportunity to review and comment on this proposed work.

Sincerely,

William J. Brune acting

William J. Brune
State Conservationist



72<



STATE OF IOWA

Office for Planning and Programming

523 East 12th Street, Des Moines, Iowa 50319 Telephone 515/281-3711

ROBERT D. RAY
Governor

ROBERT F. TYSON
Director

STATE CLEARINGHOUSE

PROJECT NOTIFICATION AND REVIEW SIGNOFF

Date Received: April 12, 1977State Application Identifier: 750396Review Completed: May 27, 1977

APPLICANT PROJECT TITLE:

Draft EIS, Des Moines 208 Areawide Waste Treatment Management Plan

APPLICANT AGENCY: U.S. Environmental Protection Agency

Address Region VII, 1725 Baltimore
Kansas City, Missouri 64108

FEDERAL PROGRAM TITLE, AGENCY Construction Grants for Wastewater Treatment Works
AND CATALOG NUMBER: Environmental Protection Agency
Office of Water and Hazardous Materials
Catalog No. 66.418

AMOUNT OF FUNDS REQUESTED:

NA

PROJECT DESCRIPTION:

Draft Environmental Impact Statement for Des Moines 208 Areawide Waste Treatment Management Plan as submitted by the Region VII United States Environmental Protection Agency.

The State Clearinghouse makes the following disposition concerning this application:

☒ No Comment Necessary. The application must be submitted as received by the Clearinghouse with this form attached as evidence that the required review has been performed.

☐ Comments are Attached. The application must be submitted with this form plus the attached comments as evidence that the required review has been performed.

STATE CLEARINGHOUSE COMMENTS:

73<

COMMISSIONERS

THOMAS A. BATES, Chairman—Bellevue
JOHN C. BROPHY—Lansing
JOHN G. LINK—Burlington
CAROLYN T. LUMBARD—Des Moines
MARIAN PIKE—Whiting
HERBERT T. REED—Winterset
JOHN C. THOMPSON—Forest City



FRED A. PRIEWERT, Director
300 Fourth Street, Des Moines, Iowa 50319
515/281-5145

An EQUAL OPPORTUNITY Agency

June 6, 1977

Environmental Protection Agency
Region VII
1735 Baltimore
Kansas City, Missouri 64108

Attention: Edward Vest

Dear Mr. Vest:

Enclosed are the official comments of the Iowa Conservation Commission's reference to the Des Moines Areawide Waste Treatment Management Plan for inclusion into the final Environmental Impact Statement.

Sincerely,

Fred A. Priewert, Director
Iowa Conservation Commission

FAP/DH/tl

Enclosure

March 1, 1977

74<

ITEM NO. _____

IOWA CONSERVATION COMMISSION POSITION STATEMENT
TO THE DES MOINES METROPOLITAN SEWER PLANNING POLICY COMMITTEE

The Iowa Conservation Commission has a deep-seated concern for the Iowa's water quality. We wish to express our support of upgrading water quality to the 1983 'fishable and swimmable' standards, which the Commission believes is a must for quality recreation and fish and wildlife habitat.

Comment 1

In regard to the future extension of sewer service into the metropolitan region, the Commission urges that growth impacts on resource utilization be thoroughly assessed. We do not support the extension of utilities into those areas of the metropolitan region that promote urban, commercial or industrial development at the expense of natural areas with potential for outdoor recreation, scenic open space and fish and wildlife habitat. We therefore suggest that these sewer extensions be coordinated with a metropolitan land use plan in which growth is accommodated in areas of low natural resource value.

Comment 2

In addition, the Conservation Commission would like to support the multiple purpose utilization of lands and easements acquired for the Areawide Waste Treatment Management Plan. These lands and easements offer the metropolitan region the opportunity to secure open space for recreation and recreational access to area water bodies.

The 1972 Water Pollution Control Act directs attention to this opportunity:

"The Administrator shall encourage waste treatment management which combines 'open space' and recreational considerations with such management."
(Section 201(f)).

Comment 3

Sewer easements often parallel our communities, rivers, streams, and attractive water bodies; treatment plants often lie near water. Careful preplanning, design, and acquisition of these easements and lands with recreation uses clearly in mind will give many benefits:

- Provide access for hiking, bicycling, horseback, snowmobile, and cross-country ski trails.
- Afford access to water's edge for fishing, boat launching and swimming.
- Create parks and open spaces.
- Protect waterside banks and scenic setting for public enjoyment.
- Link neighborhoods, playgrounds, schools, natural areas, and shopping areas in trail and open space systems.
- Maintain buffer strips to protect water quality.
- Provide a joint utility corridor--for water mains, gas lines, power lines.
- Shape future community growth and open space patterns.

76<
city of des moines

Department of Public Health
AIR POLLUTION CONTROL
Telephone: 283-4056



June 2, 1977

United States Environmental Protection Agency
Region VII
1735 Baltimore
Kansas City, Missouri 64108

Re: Draft E.I.S. for
Des Moines 208 Plan

Dear Sirs:

After reviewing the portions of this draft EIS that appeared to relate to air pollution, the following comments are offered for your consideration:

1. Des Moines and Polk County air pollution chapters contain restrictions on emissions of odors. Pages V-8 and VI-1 of the draft EIS discuss impacts on air (particulates and carbon monoxide) but do not mention odor emissions from the new sewage treatment plant.
2. On page IV-4 under Sludge Disposal it is indicated that grease collected would be landfilled or burned in an incinerator but page V-8 says no sludge incineration is anticipated. Thus, what, if any, impact grease incineration might have on air quality should be at least mentioned on V-8.
3. On page V-8 it says that "The proposed plan would have no major primary impact on the air quality of the City of Des Moines or the region." This department anticipates indirect negative impacts on air pollution due to concentration of new industrial growth along the limited number of trunk lines. The draft EIS goes on to say that "The proposed plan will have a positive impact on air quality maintenance in the long run..." This department anticipates that the indirect negative impact could be greater than the positive impact derived from open space areas and corridors. In any event, these issues should be mentioned in the draft EIS.

Comment 1

Comment 2

Comment 3

77<

United States Environmental Protection Agency
June 2, 1977
Page Two

Sincerely,

Robert N. Moss

Robert N. Moss
Air Pollution Engineer

RNM:nb

cc: Dr. Julius S. Conner
Roger V. Grunow

city of des moines*Office of the City Manager*

June 14, 1977

Mr. Charles Wright
Acting Regional Administrator
U. S. Environmental Protection
Agency
Region VII
1735 Baltimore
Kansas City, Missouri 64108

Dear Mr. Wright:

Re: Draft Environmental Impact
Statement for Des Moines
208 Areawide Waste Treat-
ment Management Plan

The City of Des Moines has reviewed the draft Environmental Impact Statement for the Des Moines 208 Areawide Waste Treatment Management Plan dated March, 1977.

In general, the Environmental Impact Statement has addressed the major areas of concern. However, the area of economic impact has not been addressed completely.

The Des Moines 208 Areawide Waste Treatment Management Plan targets 1983 as the date for completion of all proposed trunk line sewer extensions and waste water treatment facilities. With the completion of the trunk sewer extensions, unincorporated undeveloped land will have a significant economic advantage which will result in direct competition for development with the incorporated areas of the central cities. The Environmental Impact Statement should have addressed, in more detail, the negative impact that sprawled development will have on the central cities.

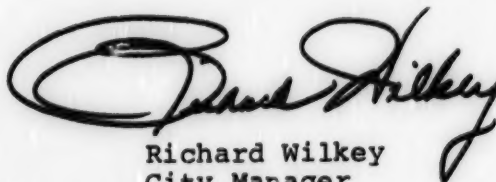
Comment

Page Two
Mr. Charles Wright

June 14, 1977

If you are in need of additional information regarding this matter, please contact Mr. Robert W. Mickle, Planning Director, at telephone No. 283-4182.

Sincerely,



Richard Wilkey
City Manager

RW/dh

cc: Central Iowa Regional Association
of Local Governments

Mr. M. A. Iverson,
City Solicitor, Intergovernmental
Programs

Mr. Leo L. Johnson,
Public Works Director

Mr. Robert W. Mickle,
Planning Director

Mr. Harold E. Smith,
City Engineer



IOWA POWER
823 Walnut Street
Des Moines, Iowa 50309
515-281-2900

May 16, 1977

U. S. Environmental Protection Agency
1735 Baltimore
Kansas City, Missouri 64108

Attention: Mr. Charles V. Wright
Acting Regional Administrator

Gentlemen:

Re: Environmental Impact Statement for the Des Moines 208 Area Wide
Waste Treatment Management Plan

We have reviewed the environmental impact statement for the Des Moines 208 Area Wide Waste Treatment Management Plan, and understand the concerns regarding Iowa Power's use of the river water as expressed on page II-31 of the document.

Iowa Power is aware of the problems of the withdrawal and discharge of cooling water in the Des Moines river. For the past year, we have been actively engaged with engineering consultants in a program studying alternative methods affecting plant cooling.

We have presented to the Iowa Department of Environmental Quality, a proposal for altering the Des Moines Power Station cooling system in a way which would virtually eliminate dependence on the Des Moines river, and would eliminate the discharge of cooling water into the river.

We appreciate this opportunity to comment on the subject EIS. If you or your staff have any questions regarding this matter, please contact me at (515) 281-2220.

Very truly yours,

E. F. Buckley, Jr.
Senior Electrical Engineer

cc: R. F. Schlenker

APPENDIX D

**LETTER FROM CIRALG TO IOWA DEPARTMENT OF
TRANSPORTATION CONCERNING THE DRAFT EIS
ON PROPOSED ARTERIAL HIGHWAYS 500 AND 592
THROUGH THE 208 STUDY AREA**



June 15, 1977

East Locust
Ames, Iowa
50309

5-244-3257

Cutive Board
Chairman

Mayor
C. D. Millsap
Jessor Heights

ce Chairman
Mayor
Ollie Weigel
Ankeny

Treasurer
Mayor
Murray Drake
Des Moines

rs-at-Large
Supervisor
Dard Brannon
Polk County

Mayor
w McKinney
Cumming

Supervisor
Hammond
Story County

Mayor
thard Olson
Des Moines

div Director
K. Harney

Mr. Robert Humphrey
Project Planning Engineer
Iowa Department of Transportation
Ames, IA 50010

Dear Mr. Humphrey:

Upon receipt of your letter of May 17, 1977 regarding the Central Iowa Regional Association of Local Governments' comments on the draft Environmental Impact Statement (E.I.S.), we have assessed your response and must reaffirm our position of March 31, 1977 that the proposed Arterial Highways 500 and 592 are in conflict with the locally adopted areawide plans developed under Section 208 of the Public Law 92-500. In addition, we are requesting that the following comments be included in the final E.I.S.

We agree with your comment that each alternative would have different corridor development patterns with resulting population distribution patterns varying accordingly. However, this only serves to reflect a philosophy of developing highway facilities and allowing growth and land use development to conform. By adhering to this philosophy the report has arbitrarily chosen to alter the locally adopted Intensity Development Pattern (208 I.D.P.) thereby creating secondary growth and economic impacts through the different population distribution patterns. It is recommended that I.D.O.T. utilize the 208 I.D.P. as a base line for the Arterial Highways 500 and 592 Alternatives for the purpose of determining the base need for and viability of each such proposed alternative.

Although you have shown a relationship between the 208 I.D.P. and the C.I.R.P.C. Metrosector population projections, which may or may not be accurate, the fact remains that the C.I.R.P.C. Metrosector information and land use patterns were superseded by the 208 I.D.P. in January, 1976 as evidenced by the attached resolutions (Exhibit "A"). We should like to emphasize that this information has been made available to the I.D.O.T. staff and consultants since that date.

To: Robert Humphrey

- 2 -

June 15, 1977

As to your comment regarding C.I.R.A.L.G.'s knowledge of the planning for Arterial Highways 500 and 592 it should be understood that this planning was considered in the 208 I.D.P. Alternatives by members of the local Plan and Zoning Commissions representing the 26-government area. The final adopted 208 I.D.P. did not include either 500 or 592 based on first, the fact that I.D.O.T. staff refused to specify a construction time schedule therefore no particular time sequence could be assigned, and second that the proposed highways would be in conflict with the established policy to "maximize the use of existing wastewater facilities and collection systems that prove to be cost effective."

While we do not disagree with your statement on the effects of increased turbidity, sedimentation and erosion on indigenous organisms, we do take issue with the I.D.O.T.'s lack of study on the potential negative effects of 500 and 592 on the water quality of rivers and streams as a result of induced growth into vacant and agricultural areas. The drainage basins which would be affected by these highway projects have been the subject of two years of intensive study by local governments, the Iowa Department for Environmental Quality, and the United States Environmental Protection Agency to determine the most cost effective means to achieve the nation's 1983 Water Quality Goals. The study included an analysis of each drainage basin's ability to accommodate effluent discharges in the receiving rivers or streams. Through this study it was determined that unrestricted or induced growth such as that resulting from the proposed 500 and 592 project would only serve to compound water quality problems within the 208 Study Area, thereby placing additional tax burdens on the local units of government.

The draft E.I.S. and 500 and 592 Corridor Studies in our opinion not only have failed to consider the ramifications of secondary land use impacts on the 1983 Water Quality standards, but also have neglected to consider the economic impact of:

1. Movement of development from the existing incorporated areas to unincorporated vacant areas.
2. The resultant tax base loss associated with this induced out migration of growth.
3. The marginal reductions in A.D.T. on Army Post Road (in some areas increased A.D.T.) with the development of Alternative 4/4A as documented in the I.D.O.T. Route Location Study - Freeway 592, Dec. 1974, pages 63 and 69.

Based on our concerns expressed on the aforesaid issues and the February 14, 1977 Des Moines Urban Area Transportation Policy Committee recommendation that the Federal Aid Primary funds committed to these projects be reprogrammed to existing routes with unmet needs in the urbanized area, Exhibit "B", we must restate that the proposed Arterial Highways 500 and 592 are in conflict with the current established policy and adopted plans. However, it is not the intent

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To: Robert Humphrey

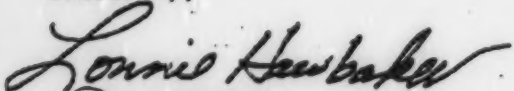
- 3 -

June 15, 1977

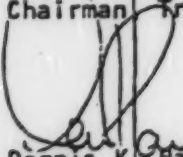
of this letter to permanently enjoin the proposed Arterial Highways 500 and 592. Rather, we are suggesting that the Iowa Department of Transportation delay selection of a specific alternative and right of way acquisition until such a time as the Iowa Department of Transportation has had an opportunity to re-evaluate all alternatives utilizing the 208 Base Line Information, and that the funds which are currently anticipated for right of way acquisition or construction be reprogrammed to meet specific needs on North-South routes as identified by the Des Moines Urban Area Transportation Policy Committee.

We believe that a temporary delay as suggested would enable the State and local elected officials an opportunity to place both the highway and sewer planning programs on a similar time frame, thereby alleviating the current conflict without necessarily jeopardizing either.

Sincerely,



Lonnie Hawbaker
Chairman, Transportation Technical Committee



Dennis K. Harney
Executive Director, CIRALG

GLP:LH:DKH

rms

cc: Iowa Department of Transportation, Victor Preisser, Director
Department of Environmental Quality, Larry Crane, Executive Director
Environmental Protection Agency, Charles Wright, Acting Regional Administrator
Federal Highway Administration, Terry Isaacson, Regional Administrator

COPY OF ADVERTISEMENT
Exhibit "A"

(T-33) — NOTICE OF PUBLIC HEARING
The Des Moines Metropolitan Sewer Planning Policy Committee will hold a Public Hearing on January 21, 1976, at 7:30 p.m., in the Des Moines Area Community College auditorium on the Anthony Campus concerning a Preliminary Intensity Development Pattern for the Des Moines Metropolitan Area.
The Des Moines Metropolitan Sewer Planning Policy Committee was designated by the Governor of State of Iowa and the U.S. Environmental Protection Agency to carry out an Area-wide Waste Treatment and Management Planning Study for the Des Moines Metropolitan Area. This Planning Study is intended by local units of governments to coordinate and comprehensively determine publicly acceptable and implementable solutions to water quality problems within the Metropolitan Area.
As part of this Planning Study a Preliminary Intensity Development Pattern which reflects future growth and development within the Area is being developed as an initial basis for determining future wastewater flows and pollution loads within the Area's rivers and streams.
Copies of the Preliminary Intensity Development Pattern and summary documentation may be obtained on or after January 16, 1976, from the Central and Regional Association of Local Governments, 212 E. Locust, Des Moines, Iowa 50319. Telephone 4-3227. Complete documentation is open for inspection at the same place.
In order to more fully acquaint the general public in the planning process a presentation followed by question and answer session will be included. Formal written and oral comments on the presented preliminary Intensity Development Pattern will be accepted. The record of the hearing will remain open for fifteen (15) days after the hearing for the receipt of additional written comments which will be included as part of the Hearing Record. The communities involved in the Area-wide Waste Treatment and Management Planning Study are as follows: Albia, Albia, Ankeny, Berkeleyside, Carlisle, Hill, Cummins, County of Dallas, Des Moines, Harlan, Grant, Grimes, Harmond, Jewett, Johnston, Marshall, Pleasant Hill, Polk City, County of Polk, Ruddick, Spring Hill, Urbandale, County of Warren, Waukee, West Des Moines, Winterset, and Writtle.

Affidavit of Publication

STATE OF IOWA }
POLK COUNTY } ss.

The undersigned, being first duly sworn, on oath states that he is the Auditing Department Manager of Des Moines Register and Tribune Company, a corporation duly organized and existing under the laws of the State of Iowa, with its principal place of business in Des Moines, Iowa, the publisher of

THE DES MOINES REGISTER (Daily)

DES MOINES TRIBUNE (Daily)

DES MOINES SUNDAY REGISTER

newspapers of general circulation printed and published in the City of Des Moines, Polk County, Iowa; and that an advertisement, a printed copy of which is hereto annexed as Exhibit "A" and made a part of this affidavit, was printed and published

in said The Des Moines Register (daily) the following dates _____

in said Des Moines Tribune (daily) the following dates _____

January 19, 1976

in said Des Moines Sunday Register on _____

The affiant states that all of the facts set forth in the foregoing affidavit are true as he verily believes.

Subscribed and sworn to before me by said affiant this 19th day of

January 1976

Notary Public in and for Polk County, Iowa

WHEREAS, the Des Moines 208 Planning Program requires the development of an Areawide Intensity Development Pattern for use in projecting future flows and waste loads related to water quality, and

WHEREAS, a Preliminary Intensity Development Pattern has been developed by the Metropolitan Sewer Planning Land Use Sub-Committee for use in initially projecting future waste loads and flows, and

WHEREAS, said Preliminary Intensity Development Pattern is to be re-evaluated based upon engineering, cost, environmental and water quality data by the Metropolitan Sewer Planning Land Use Sub-Committee when such data becomes available through the Des Moines 208 program,

NOW THEREFORE, BE IT RESOLVED BY THE METROPOLITAN SEWER PLANNING LAND USE SUB-COMMITTEE:

1. That the Preliminary Intensity Development Pattern is hereby approved by the Metropolitan Sewer Planning Land Use Sub-Committee for use as an initial tool in the projection of future waste loads and flows related to water quality within the Des Moines 208 Study Area.
2. That as soon as practical the appropriate engineering, cost, environmental and water quality data as developed within the 208 program be made available to the Metropolitan Sewer Planning Land Use Sub-Committee to make any adjustments or revisions to the Preliminary Intensity Development Pattern.
3. That the Preliminary Intensity Development Pattern is hereby recommended to the Des Moines Metropolitan Sewer Planning Coordinating and Policy Committees for their review and approval, and should changes or revisions be made to this Preliminary Intensity Development Pattern by either of these Committees that these changes or revisions be referred back to the Metropolitan Sewer Planning Land Use Sub-Committee.
4. That at such time as the Metropolitan Sewer Planning Policy Committee concurs in the recommended Preliminary Intensity Development Pattern that it is recommended to the Policy Committee that a Public Hearing be held in order to allow for adequate public comment to be obtained on the Preliminary Intensity Development Pattern as finally approved.

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Mayor Drake stated he felt the adoption of the Intensity Development Pattern would eliminate much duplication.

Mrs. Hamilton suggested that it be put into the Policy Committee record that the Committee is concerned about energy conservation and that the Committee is trying to seek solutions and will assist in any way to help solve all types of energy problems.

RESOLUTION

Dr. J. H. P. Smith

DATE: April 28, 1976

5. FUTURE ACTION: Adopted

Dr. J. H. P. Smith

IT "B"

DES MOINES URBAN AREA TRANSPORTATION POLICY COMMITTEE

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DATE:

2/14/77

ING RECORD

WARRANT UNITS	AYE	NAY	PR	REPRESENTATIVES	AYE	NAY	PR	ALTERNATES
JE				Bert Auman, C.	X		X	Tom Reinhard
MOINES				Richard Olson, M.	X		X	Mrs. Helen Barlow
MOINES				Archie Brooks, C.				Russ LaVine, C.
MOINES	X		X	Mrs. Nadine Hamilton				Wallace Buss, C.
NSTON	X		X	Harold Neff, C.				Alan Collet
ASANT HILL				Kent Forbes, C.				Richard Delk, M.
K COUNTY				Richard Brannan, S.				J. Bishop, S.
K COUNTY	X		X	John Andrews				S. Anania, S.
RANDALE	X		X	Irving Bradley				J. Freeman, M.
ET DES MOINES	X		X	Murray Drake, M.				W. Kent Gaer, C.
INDSOR HEIGHTS				D.C. Millsap, M.	X		X	Charles Werner

ATION: The Des Moines Urban Area Transportation Policy Committee hereby recommends that the existing routes which unmet needs in the urbanized area, be established first priority for funding, such as 63rd Street, S.E. and Army Post Road; and, that funding for 592 be considered for future dates, and that the Transportation Technical Committee is hereby directed to reestablish funding priorities on existing primary routes within the urban area with specific concern on North-South routes.

MOVED BY: Helen Barlow, Des Moines

SECONDED BY: John Andrews,

Polk County

S 8 NAYS PRESENT 8

COMMITTEE ACTION: Approved